THE MOTOR AGE

THE AUTOMOBILE AUTHORITY.

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CURRENT NOTES AND COMMENTS

New York, Dec. 16.—(Midnight.)—After a story had been sent MOTOR AGE to-night that Fournier would announce to-morrow the full particulars of the completion of his negotiations for the formation of a new company to manufacture a vehicle bearing his name, a dispatch reached this city from Albany saying that the Fournier-Searchmont Automobile Co., of Saratoga Springs, was incorporated to-day with a capital of $2,000,000, to manufacture vehicles, cars and boats to be propelled by steam, electric, gasolene and other power. The incorporators are Spencer Trask, John L. Elliott, Acasta Nichols, E. N. Potter and Cecil Barret, of New York; Benjamin Prince, of Irvington; Charles J. Peabody, of Englewood, N. J., and Carl G. Smedburg, of Flushing, L. I.

Fournier could not be found by your correspondent to-night at the Hotel Martin. In former conversations with the writer, however, he had talked freely about his plans. The new Fournier vehicles will be mainly medium powered touring cars, though a racing car will be built to be ridden by him in record trials and races.

His own ideas and those of his associate, Mr. Schmidt, a former foreman in the Mors factory, will be embodied in the new vehicle.

Fournier says he will be vice-president of the new company and that he will sail on Wednesday for France, to be absent a month.

Rigal Beats French Records

If cabled reports prove to be reliable, the French record has been badly beaten, and by a motor tricycle. For some weeks past Rigal, with a motor tricycle, and Truffault, with a machine constructed for racing and classed as a voiturette, have been establishing records on the roads about Paris. Their doings have been fully reported in this paper. On Sunday last these trials were resumed and Rigal is reported to have made a mile in the phenomenal time of 53 2-5s. His time for a kilometer was 33s. Truffault did a kilometer in :40 1-5 and a mile in 1:07, and Gabrielle, with a light Darracq, went a kilometer in 53s and a mile in 1:06 1-5, both with standing starts. The speed of Rigal's mile was equal to within a small fraction of 68 miles an hour.

The machine ridden by Rigal was doubtless the Darracq, on which his earlier records were made. It has a two-cylinder Buchet motor, the same one which broke the records in the Gaillon hill-climbing contest recently reported. The motor, weighing 138 pounds, develops no less than 13 horsepower and the total weight of the tricycle itself is 264 pounds. Rigal attaches a heavy lead plate to the front head tube to steady the front wheel and prevent, as far as possible, its jumping under the impulse of the enormous power at starting, but even with these precautions it requires a great deal of nerve and skill to drive the machine without accident. With motors now developing from 12 to 14 horsepower and of more than half the total weight of the tricycle it is difficult to see how manufacturers can continue to improve their speed. They have already gone much further than the makers of heavier machines have dared attempt to go.

New York Notes and Comments

New York, Dec. 16.—Fournier intimated to the writer on Saturday that he had closed his deal for the formation of a company to build the Fournier machine and would give particulars on Tuesday. A few evenings ago when the writer called on him at the Hotel Martin he found him in his room in conference with Mr. Gallagher, of the Searchmont Motor Co. Fournier was absent from town several days early this week. It may be that these two facts can be put together.

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To-day the writer saw a newspaper man close to Fournier, who said he had been told by the Frenchman that the papers for the incorporation of the Fournier Automobile Co. would be signed to-morrow and that he would sail for Europe on Wednesday. The reporter in question inferred that Foxhall P. Keene was to be an officer in the company, though on a previous re-

port of this kind Fournier said to the writer that neither Mr. Keene nor Mr. Vanderbilt were interested financially or otherwise in any of his automobile building schemes.

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The meeting of the governors of the Automobile Club of America to take final action on the agreement of affiliation submitted by the law committee has not even at this late day occurred and at the club no news of a call for a meeting by President Shattuck was in sight. The formal action taken by the Long Island Automobile Club at its annual meeting last week in favor of a national association makes the general acceptance of the club's plan of affiliation still more improbable.

* * *

Ward Chamberlin, of the Automobile Club of America, is to make a tour of New York state on a guide-post crusade. The commissioners of highways in any county are compelled to erect guide-posts on the petition of 25 property holders and Mr. Chamberlin's mission is to get signatures to these petitions and have guide-posts erected in as many counties of the state as possible before the next riding season opens.

Motor Cycles at the English Shows

Owing, perhaps, to the powerful construction of the American motor cycles and the large motors used in comparison with European machines, there is a well defined idea that we are ahead of the English makers in this line and it may surprise some of the motocycling enthusiasts to learn that at the recent London shows there was an exhibit of motor bicycles that it would be impossible to approach in this country. At the Stanley show there were 105 motor bicycles, three motor tricycles and seven motor quads. The National showed sixty-one motor bicycles, nine motor tricycles and three quads.

An Important Tire Decision

The United States Court of Appeals has rendered a decision sustaining the famous Tillinghast single tube tire patent which has been in litigation for 5 years or more. This action decided an appeal from a ruling made by Judge Colt, on November 14, 1899. The full text of the latest decision has not yet been made public.

When the case was started it related principally, and almost entirely, to bicycle tires, for the automobile had not then become of sufficient importance to cut much figure one way or the other. It is likely, however, that the owners of the patent were far-seeing enough to recognize the value of the invention in connection with automobiles and horse-drawn vehicles of the future.

The patent was granted to Pardon W. Tillinghast of Providence, R. I., on May 23, 1893, and described a single tube tire composed of two annular rubber tubes and intervening fabric, all vulcanized together and forming a complete integral tire, having all of its component parts securely united. The patent passed, in due course, into the hands of Col. Theodore A. Dodge, who, acting on the theory that practically all single tube tires were infringements, commenced suit to establish its validity. It took about 3 years to take all the evidence and reach a decision which was eventually rendered in favor of the patent. That there might be no possibility of further argument it was decided to carry the case up and place the matter beyond further dispute, and this has been successfully accomplished.

Even before the first decision had been rendered Colonel Dodge found no difficulty in inducing the principal makers to accept licenses. He argued that it would be far better for them to assist in sustaining the patent, and pay an nominal fee of 25 cents per pair, than to defeat it and throw the industry open to all comers, an argument which struck home, because at that time so many shoddy tires were being placed on the market, at such ridiculously low prices and of such vile quality, that the trade was being ruined. One of the conditions of the licenses established the prices at which tires might be sold. The license also permitted the licensee to carry out contracts then existing and this led to considerable trouble, some of the makers claiming that others were taking advantage of this clause and selling tires at prices which were intended to be prohibited by the terms of the license.

The fee of 25 cents per pair does not, of course, apply to automobile tires.

The claims involved in the controversy just closed were as follows:

1. A pneumatic tire, consisting of a rub-

ber air tube, and outer covering, substantially as specified, with the ends of the air tube and other component parts securely united by vulcanization, substantially as described, thereby constituting an integral complete tire.

2. A pneumatic tire composed of a rubber tube, an intermediate layer of fabric and an outer covering of rubber, substantially as described, having all its rubber joints and component parts simultaneously vulcanized together, forming an integral annular tire.

The second claim was sustained by the court. It is so broad as to cover every known way of manufacturing single tube tires as at present constructed, although there have since been designed one or two tires which the makers claim are as good as any and the process of making which, they say, does not infringe the patent.

Will Support a National Association

The Long Island Automobile Club showed at its late annual meeting that it is by no means in favor of the plan of affiliation proposed by the A. C. A., but is in favor of the formation of a national association.

Prior to the discussion of this matter the regular order of business had been gone through. The election resulted in the unanimous choice of the following officers: President, W. Wallace Grant; vice-president, Edward Pidgeon; treasurer, Frank G. Webb; secretary, Louis A. Hopkins; governors, Nathaniel Robinson, M. D., A. R. Pardington, L. R. Adams, Edward Pidgeon, C. J. Field, John W. Newbery; committee on admissions, Charles Rockliff, A. N. White and H. R. Perkins.

The reports of the various officers and committees were received, that of the contests and exhibitions proving particularly interesting, as it treated of the successful 100-mile endurance test held April 20, and the 1-mile speed test held November 16.

The annual meeting was followed by a banquet held at the Union League Club. Thirty members of the club sat down to a magnificently prepared dinner, the chairman of the banquet committee being John W. Newbery. Specially designed and prepared menu cards facetiously alluded to members, particular events, etc. John W. Newbery, the chairman of the committee, acting as toastmaster, called upon L. R. Adams, the old president, to speak on "The work of the club for the past year," Mr. Grant, the new president, "Outlining the policy of the club for the ensuing year." Malcolm Ford, editor of the Automobile Magazine, spoke on "The relation of the trade and technical press to the sport"; C. J. Field, "Personal experiences and reminiscences of the Buffalo endurance run"; A. N. White, "What I know about gasoline automobiles"; A. R. Pardington, "The ideal steam vehicle," and F. G. Webb, "The national association for the control of the sport."

Mr. Webb's remarks were discussed by Messrs. Field, Ford, F. S. Rae, Newbery, J. D. Schulz, George B. Adams, Alden McMurtry, and A. R. Pardington. The sentiments expressed were favorable to the organziation of a national association, to be composed of delegates chosen from automobile clubs at large, this association in turn to make its rules for the proper development of the sport, and all clubs signifying their acceptance of these rules prepared by their representatives to be governed by the rules thus prepared. The proposition of the Automobile Club of America to affiliate with it on lines and under rules formulated solely by it was not favorably received.

Mr. Grant, the new president of the club, urged upon the members the full importance of co-operation on their part to the end that this club, already acting and energetic, should fill the place which seemed prepared for it. The club voted to make one Wednesday night in each quarter a specially attractive club night, meeting for dinner at some club or hotel for the discussion of matters pertaining not strictly to their club affairs.

The California Motor Trade

San Francisco, Dec. 7.—The recently organized California Motor Co., of this city, is in a well-contented frame of mind. The vice president, J. W. Leavitt, remarked last evening: "Within the next week we shall have the first four of our motor bicycles completed and placed in stock, one in each of our salesrooms, located, respectively, in San Francisco, San Jose, Oakland and Los Angeles. One of them was pushed along in the shop 3 days ago to the finishing point, and subjected to a thorough road

trial, the result being entirely satisfactory. We are not expecting an immense volume of trade in our motor bicycle line right away, but we have confidence that we have the right machine, and accordingly we shall keep our shop humming this winter to have a good output in the spring, when we anticipate, through the advertising our various agencies will have given the motor, a demand equal to the supply."

Automobile Exports

Washington, D. C., Dec. 11.—The following figures show the exports of automobiles and kindred lines from the port of New York for the week just ended:

British East Indies: Motor vehicles and parts, seven packages, $960.

Havre: Motor vehicles and parts, thirty-nine cases, $34,000.

London: Motor vehicles and parts, thirty-nine packages, $11,512.

Why Automobilists Don't Stay

Complaint has been made many times, by victims of accidents caused or alleged to have been caused by the presence of automobiles, that the owners of the vehicles do not stop to ascertain what damage has been done but proceed on their way without offering to render assistance. Here is an answer. It relates the experience of one of those good-hearted souls who try to do the best they can under adverse circumstances and suffer for their pains. It is the narrative of Dr. Frank W. Brandow, of Pittsfield, Mass., who has been sued for $5,000 and sends the details for the benefit of other users of automobiles:

"This last spring," the doctor writes, "I bought a Winton automobile. I went out one day with a friend for a little spin to Lanesboro, about 3 miles north of this city. Just as I rounded over a little hill I saw a single rig coming. The horse stopped and turned a little. I immediately stopped, threw off my switch and started to run to the horse, as I saw a woman was driving. The carriage contained two women and a child. The horse turned a little and the woman who was driving screamed and dropped the lines. My friend and I started on a run to the horse but before we reached them the horse turned short and upset the carriage. The old lady, the mother of the woman driving, sustained a broken arm. I told the people I certainly did all I could and then we measured the distance between the machine and where the horse stood and found it to be just 99 feet. I measured it very carefully with a piece of wire I had in my tool box. I urged the farmers who came out where the accident happened to look at the measurement and actually offered to pay them for the trouble, but they refused, cursing the automobile.

"I then went to the city and brought back a surgeon and assisted him to set the broken arm. After this was done I sent a carriage, at a big expense, to take the woman home, 3 miles out in the country. Then I advised the woman to go to the hospital. This she did and I secured the services of the best surgeon, who cared for her until she went home. All these expenses I paid and then offered a reasonable settlement, which was refused.

"Now this woman brings a suit against me for $5,000. Of course it is foolish on her part, for I do not consider she has any claim on me at all. My stopping as I did 99 feet ahead of the rig ought to settle it all.

"I have simply stated facts here, thinking perhaps you would like to use it."

Coming East to Investigate

Two Pacific coast investigators will start eastward the first week in January to see what may be purchased in the automobile line for two stage companies running from Raymond to the Yosemite and from Chinese Camp to the Yosemite. During the past summer two automobiles made the trip via the Big Oak Flat route under distressing circumstances, meeting with breakdowns and numerous other delays. A. H. Washburn of the Raymond route intends to look at automobiles, with a view to placing them on the road from Raymond to the Yosemite, and J. White, the general passenger and ticket agent of the Big Oak Flat Stage Co., will leave for Chicago to look into the automobiles for his company. Pending Mr. White's report to the stage company, there will be no attempt to do away with any of the stages or horses. Paul Morris, the superintendent of the Big Oak Flat and Yosemite Stage Co., offers to bet $500 that automobiles carrying twelve persons cannot make the

trip to Yosemite over the mountain roads in as good time as regular stages.

A Premium Upon Perjury

Camden county, New Jersey, has a law regulating the use of automobiles which is calculated to do great mischief because it puts a premium upon perjury. Any one who runs an automobile at a greater rate than ten miles an hour is subject to a fine of $20, of which one-half goes to the informer. This provides an easy way for any one to get a $10 bill. There is no very sure means of determining by casual observers the rate of travel; the informer swears that it was greater than 10 miles an hour; the owner of the automobile contradicts him, and the magistrate is called upon to decide a question of veracity. It is easy to see what the decision will be when a non-resident is to be plucked to the advantage of a neighbor, perhaps a friend. It is sometimes necessary to offer a part of a fine to an informer, as in the case of violation of game laws; but in such a case the story of the informer must be supported by physical evidence—the game which has been unlawfully shot, or is about to be taken out of the state. There is no such safeguard against perjury in this automobile law. It is, in effect, an invitation to the inhabitants of Camden county to mulct automobilists under cover of law of $20 per head whenever they enter the county, the proceeds to be divided, the informer getting half. For the sake of the morals of the county the freeholders should repeal or modify the act.—Philadelphia Public Ledger.

Automobiles at Belvidere

The National Sewing Machine Co., of Belvidere, Ill., is a gigantic concern which has the reputation, throughout the world, of making good goods. Heretofore it has manufactured sewing machines and bicycles, but it has been an open secret for the last few weeks that an investigation of the automobile business was in progress. Some weeks ago the company accepted a contract to make a number of vehicles for the Friedman company, but this is an outside matter and has no connection with the machine with which the company is experimenting on its own account. The National company will make gasoline vehicles on French lines. A four-cylinder motor will be used. No attempt will be made to place any of them on the market for the coming season, but the company expects to be ready to offer them to the public about next fall.

Short on Autos, Long on Hills

As a model city for the conduct of hill-climbing contests Cincinnati is commended to the powers that be. It has been said that the city is backward in automobiling, and one of the papers has undertaken to show why this is true.

Cincinnati's beautiful hills and sylvan glades and magnificent valleys are great institutions in their way, says the reporter, but they are not exactly conducive to activity in the local automobile market. When the inventor puts a machine on the market that can climb a tree then will the automobile habit capture and hold in its fond embrace all the wealthy citizens of Cincinnati.

In other cities, in most of them, in fact, the suburbanite can use his automobile. Here the business portion of the city is in the valley, and the suburbs are up on the hills. To go to almost any one of the suburbs around Cincinnati a person must ascend Walnut Hills, Clifton, Avondale, Price Hill, Mount Auburn, all separated from the business portion by steep hills. That's the reason that the street cars in the city have to be equipped with more powerful motors than do the cars of almost any other city in the world.

The Vine street grade averages about 7 feet to the hundred from McMicken avenue to the top of the hill. Few people stop to consider how steep the streets really are. Take Gilbert avenue, for instance. There are few more generally traveled streets in or about the city than Gilbert avenue. It is the gateway to Walnut Hills—the greatest residence suburb of Cincinnati. From Court street up to Elsinore (the Eden Park entrance) the grade of Gilbert avenue is about 5 per cent. That is, about 5 feet in every hundred. But these grades are none of them unreasonably steep. Take the Price Hill avenues. Warsaw is about 9 feet to the hundred.

But the real grades are Sycamore street and Milton street. Any one who has pitched forward in his cable car seat coming

down the Sycamore Street hill knows how steep it really is. And he also knows that it is one of the longest hills hereabouts. At the steepest part of Sycamore hill the grade is 13 feet to the hundred.

All the way up it ranges from 10 to 13 feet, and the automobilist that could find pleasure in traversing that thoroughfare every day must certainly be an enthusiast.

Milton street, from Price street to Young, will average 12.70 per cent, and is the steepest grade in the city where electric cars operate. So steep is it that the conductor always takes the front platform in order to handle the safety brake while a car is descending.

There are scores of other streets that lead from the center of the city to the residence portions that are equally steep, but the instances given above will serve to explain to visiting automobilists the lack of autos hereabouts.

New Corporations and Enterprises

Colonel Pardee, formerly manager of the Mobile branch in Chicago, is preparing to go into the retail business on a rather extensive scale. His location has not been actually settled yet. He has been one of the negotiators for space in the "automobile colony" at Michigan avenue and 13th street, but has not yet decided to take space there. He expects to handle a complete line of vehicles, one of which will be the Packard. Mr. Weiss, of the Ohio company, was in Chicago conferring with him early in the week. The Baker is mentioned as the line of electrics likely to be handled and negotiations are under way for one of the best steam carriages.

The Power Equipment Co. is a new concern incorporated in New Jersey with a capital of $6,500,000. The charter permits it to manufacture motors and do various other things. The incorporators are Charles H. Johnson, Westfield, N. J., and John D. Elwell and John R. Simmons, both of No. 25 Broad street, New York. The legal end of the business is looked after by Stetson, Jennings & Russell, of No. 15 Broad street. J. H. Hoadley, president of the International Power Co., is one of the chief promoters.

The Snecker Motor Co., of Greenwich, Conn., has passed into the hands of A. L. Mason and his son, Earl P. Mason, who will conduct the business under the firm name of Mason & Son. The plant will be moved to Providence, R. I. The company manufactures the two-cycle type of gasoline motor for both marine and stationary purposes.

The Lordship Park Association, of Bridgeport, Conn., is planning the establishment of an automobile line, to run from the railroad station in that city to Lordship park in Stratford. It is proposed to complete all the arrangements this winter and begin running steam carriages early next spring.

K. F. Peterson, of Chicago, has secured the representation of the Brown-Lipe Gear Co. in Ohio, Indiana, Illinois, Michigan, Wisconsin, Iowa, Missouri and Minnesota. Mr. Peterson already represents the Baldwin chain, Midgley tubular wheels and the American Roller Bearing Co.

B. W. Church, of Nyack, N. Y., is one of the incorporators of the Church Motor & Launch Co., of Nyack-on-the-Hudson. The capital stock is $25,000 and the directors are O. C. Pinckney, of Grand View-on-the-Hudson; H. C. Cornwell, of Milburn, N. J., and Mr. Church.

The new plant of the Olds Motor Works, at Lansing, Mich., has just been completed and will be placed in operation at once. The Olds company expects to be very much in evidence this season and has made arrangements for an extensive output.

The Automobile & Cycle Co. has been incorporated in Maine for manufacturing automobiles and other vehicles; capital, $10,000; president, Albert E. Knowlton, Malden, Mass.; treasurer, Frederick Downs, Malden, Mass.

Stratton Motor Co., of New York city; capital, $150,000. Directors, E. F. Stratton and David Wood, of New York City, and G. H. Murphy, Jr., of Hollis, L. I.

Sydney W. Elston and Conrad Miller have secured the agency for Waverley electric vehicles at Indianapolis and will open two stores on Massachusetts avenue.

A. C. Banker has secured the Chicago agency for the Haynes-Apperson vehicles.

Paris to Rome on a Motor Bicycle

A rider named De Guichard recently established a motor bicycle record from Paris to Rome. He rode a Clement bicycle of a type which this firm has recently brought out, that is to say, an ordinary bicycle to

which is attached a 2 horsepower motor, which can be removed when desired. He was accompanied by a Clement voiturette. The rain and the snow-covered passes of the Alps did not greatly impede the motor bicyclist, who covered the 954½ miles in 4 days 22 hours 47 minutes. The idea of undertaking the ride at the beginning of winter was to show what the motor bicycle could do under unfavorable conditions, and there is no doubt that a much better performance could be accomplished at a time of the year when the weather is more suitable for long-distance riding.

A Motor Handbook

A well designed and executed work entitled Motors in Principle and Practice has been issued by the Cycle Trader, of London. It is a compilation of a number of articles on modern motor vehicle construction which were first published serially in the Cycle Trader and is devoted to practical matters, the theoretical aspect being largely avoided.

Being intended principally for the cycle trade it deals with the construction and working of internal combustion engines and their accessory mechanism as applied to motor cycles and the lighter types of motor carriages, such vehicles, in fact, as will be liable to come into the hands of the cycle maker and repairer. Steam and electric systems have been briefly covered without attempting the consideration of the more complex principles involved in their application to road vehicles. While the various motors and accessories described are naturally of European construction there is a fund of information on general subjects which renders the book valuable to anyone interested in the industry.

According to S. F. Edge—the same Edge, by the way, who rode a Napier in the Paris-Berlin race and did so much talking about it afterward—is authority for the statement that a company in which he is interested is engaged in the manufacture of flying machines, and has orders for two which it expects to deliver in March. A Napier motor will be used and the interview seems to have been destined to tell people how wonderful a device it is. One real bit of English enterprise is the announcement by Iliffe & Sturmey, of Coventry, publishers of the Cyclist, Photography, the Autocar and other papers, that they will shortly commence the publication of a quarterly magazine, to be called Flying.

After more than a year of committee consideration the Automobile Club of America has made public the plans on which the club is willing to "affiliate" with other organizations in controlling automobilism in this country. Compared with the ideas under which the Ohio Automobile Association is seeking to advance the best interests of automobilism the plan proposed does not seem to have in it any of the elements necessary for the formation of a national organization of even the most perfunctory kind.—Motor World.

An official of the Long Island Automobile Club recently characterized the proposal of the Automobile Club of America for an affiliation of clubs as "a piece of stupendous nerve." The Syracuse club has swallowed the bait and, by an unanimous vote, has agreed to the proposal and has instructed its secretary to sign the agreement. No doubt it settled the matter without thought of the consequences or knowledge of the facts.

The extortion which has been practiced on the British public by the Dunlop company is shown by the report lately made public by the concern. It shows that while the American Bicycle Co., supplying the greater part of all the cycles used in the United States, made less than a million dollars in profit, the Dunlop company, from the sale of tires alone, made $1,397,000.

The stock of the New York Electric Vehicle Transportation Co. is to be reduced from $25,000,000 to $5,000,000 by reducing the par value of the shares to the amount paid in on them, and thus making them full paid. Officials of the company say that practically the full amount of the last installment paid is untouched in the treasury of the company.

A man who is well known in the automobile trade for having organized several successful companies was recently asked what, in his opinion, constituted a successful promoter. His answer was: "A man that can sell something he doesn't possess to people who don't want it."

BRONX PARK AUTOMOBILE SPEEDWAY

The glib rumor-monger of the yellow press has ascribed to the millionaire class—millionaires, by the way, spring up in a night under the influence of these gossips—the intention of building, for speedway purposes, everything from a steel road, 20 miles long, down to a 3-mile race track. All of these stories have been based on air. Nothing more in them, perhaps, than a stray remark by Mr. So-and-so, to the effect that "if we could only have," etc. But the public-spirited commissioners of Bronx Park, Brooklyn, are doing a thing which will insure them the blessings of automobilists and drivers—of the former because they will have a chance to show speed and of the latter because they will be annoyed by automobiles to a smaller extent than formerly. Early in the new year the park will have a speedway to equal the best of those now provided for the horsemen. It will not be quite as long as the speedway of the trotters, but it will be quite as well built, and, in some particulars, will be even better than the roadway beside the Harlem.

The new Bronx Park speedway will be reserved exclusively for automobiles, and the chauffeurs will be allowed to run their machines at the highest speed without interference. The new automobile speedway will, in fact, be to the automobilist just what the present speedway is to the drivers of trotting horses, and will be used almost wholly as a race course throughout its mile and a half of length.

The course is being built at the expense of the city and it is quite likely that a small fee will be charged for the privilege of racing upon it, partly with the idea of keeping off undesirable people and also to help pay the cost of maintenance. The work is being done by the John B. Devlin & Son Contracting Co., and is nearing completion. The contractors are hastening the work as much as possible.

The new speedway runs from the south side of Pelham avenue, through the park, almost in front of the new lion houses, and

so through the middle of the zoological gardens to the Southern boulevard. The roadway is being built in a way that would do credit to a causeway intended for the very heaviest track possible. The ground along the track of the roadway has first been excavated until the solid rock was reached. On the top of the bedrock a heavy layer of firm gravel has been placed and then there was added a full two feet of big granite rocks, placed on end, and looking rough and threatening. When the rocks are in place men go over them with heavy hammers breaking off the points and reducing the big stones to a rough level.

Then finer rocks are scattered over these rocks and an enormously heavy steam roller comes on the scene and reduces all to a fairly level, but still very rough surface. After that other layers of stone are placed on the roadway, each layer being a little finer than the last, until grit resembling granite dust is being used. The final result is a roadway as hard and level as if made of polished marble. It is absolutely dustless and yet is so porous that it holds no water. The heavy foundation of rocks allows the surface water to drain off so quickly that the road will dry in half an hour, even after the heaviest rainstorm. The roadway looks as if made of gray cement, and will stand the heaviest teaming without showing even a rut. This kind of roadway is called the Telford pavement. It was invented by Thomas Telford, a Scotchman—dead long ago—who built the bridge over the Menai Straits, drained the fens of Lincolnshire, and was knighted for his achievements.

The new road is regarded as a perfect piece of automobile track. The ordinary road, with its dust, is a terror to automobilists and is ruinous to the finer machines. The new automobile speedway is absolutely free from this objection and will therefore be hailed with the same delight with which horsemen greeted the soft and pleasant surface of the Harlem River speedway.

In a speedway intended exclusively for automobiles there are several things desirable, and it has been the object of the designers and builders of the Bronx Park speedway to embody as many of them as possible in its construction. In order to allow proper facilities for racing, it is necessary that there should be room for more than two automobiles abreast, so as to allow plenty of room for the motor carriages to pass each other when traveling at speed. The speedway will allow room for four autos abreast.

Some people prefer a straight road for racing purposes, but most skillful managers of automobiles agree that a track with plenty of curves in it offers more opportunity for the display of skill, and that, as automobiles are primarily intended for road use, the ideal race track should resemble a good road as much as possible. The new speedway in Bronx Park has been liberally curved, so that it will, when finished, resemble an elongated letter S.

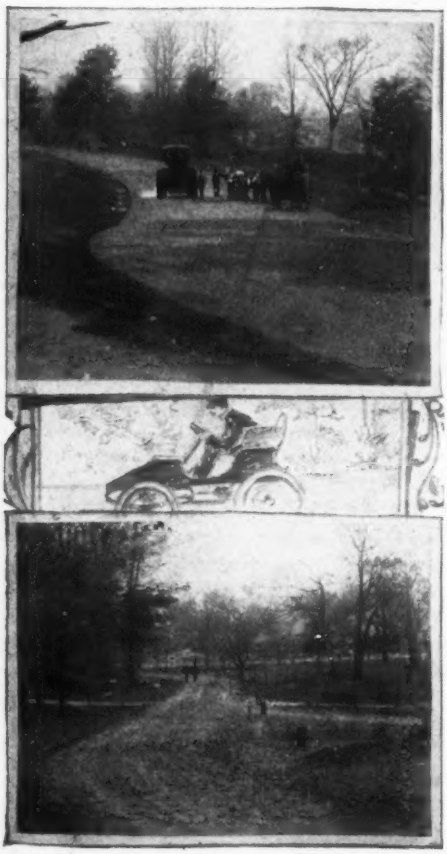
Another racing essential is that the road should be free from crossings. It is true that most of the modern racing automobiles are equipped with emergency brakes so powerful that they will stop a car almost in its own length, but a too sudden stop may derange the machinery as well as the driver. On this account the ideal automobile track should be walled in on each side, so that under no circumstances could people or animals stray upon the track. As the new auto speedway passes through Bronx Park, it cannot very well be walled in on both sides, but it happens that a long and high stone wall runs for some distance across the park, just in front of the new lion houses. The lion houses stand on a slight elevation and the new speedway for autos is at a much lower level. The consequence is that the wall along one side of it acts as a sort of retaining wall for the ground upon which the cages are built, while at the same time protecting the speedway from obstruction by pedestrians.

The wall along one side of the speedway, in fact, gives it all the effects of a sunken roadway and will permit the public to look down upon the racers from its edge and so view the most exciting contests of speed without the least danger to themselves or causing any annoyance to the automobilists. Those who have watched the equestrians in Central Park from the favorable height of the walk around the big reservoir will appreciate the advantages of such a place of observation as will be afforded by the wall in front of the new lion houses. No paths will be allowed to cross the automobile speedway.

Much care necessarily had to be exercised in locating the new auto speedway so that it would not interfere with any of the

existing paths or roadways in the park. At first it was intended to modify one of the existing roadways so that it could be used as a speedway for automobiles, but after many examinations it was found that there was not a single pathway or road within the boundaries of the park which could safely be set aside for a speedway. When that fact had been established, there began a search for a safe site for an entirely new road.

It was soon determined that the only thing to do was to build an entirely new



roadway, and it was seen that the best location for it would be one which would permit the public to see the motor carriages without being endangered by them. It was also necessary to locate the speedway in such a place that it would be accessible both to the main highways as well as to visitors to the park. For this reason it was determined to start the roadway from Pelham avenue and run it nearly due south to the Southern boulevard. At present the intention is to make the entrance at Pelham avenue and to allow speeding only in one direction, but this plan may be changed later.

American Goods in Java

Frank G. Carpenter, a correspondent of the St. Louis Republic, writes to that paper from Soerbaia, Java, as follows: "I came here to investigate the chances for American trade. There is a good opening for our bicycles and also for automobiles. There are many American bicycles used in Java. I see our leading makes in every town. Here in Soerbaia, the bicycles are taxed, and there is a number fastened to the back of the seat of every wheel. I noticed one the other day which bore the figures 2002, so I judge there must be more than 2,000 in the city. These people want a good thing, and are accustomed to paying high prices.

"It seems strange to have to get out of the way of an automobile in Java, but I was nearly run down by one the other night. The driver was a young Dutchman who was out with his sweetheart taking the air. His hand, which should have been on the lever, was about the waist of his inamorata, and he was oblivious to globe trotters and every one else.

"All kinds of carriages are used here. I see English dog carts, victorias and landaus. The rich Dutchmen drive about in fine style, and many of the native chiefs and nobles have magnificent turnouts. The ordinary vehicle is the sado, or dos-a-dos, a sort of a little dog cart drawn by a pony, in which the driver sits in front and the passengers behind, facing the rear. These are the cabs of Batavia, Soerbaia and the other cities, although there are larger vehicles for hire. No one thinks of walking in this hot climate, and in the cooler parts of the day the roads are full of carriages, private and public. There are native coachmen and footmen in livery, and, according to law, each coachman has to have a whistle to warn others to keep out of his way. He carries this in his mouth and toots once or twice at every block."

THE AUTOMOBILE FOR HEAVY DUTY

A PAPER BY ARTHUR HERSCHMANN, OF THE ADAMS EXPRESS CO. NUMBER TWO.

As regards the construction of steam propelled wagons we find that in spite of the fact that steam equipment has been known for many generations, and wagon building has been going on for thousands of years, comparative success has only been obtained within the last few years. Messrs. Scotte and Serpollet De Dion in France were the first to revive the movement, but in the last few years more progress was made in England, in which country the best steam wagons, so far, have been produced. Easy riding wagons have been constructed for many years, and boilers, steam connections, and engines do not give much trouble on rock bottom foundations; but when we attempt to locate engine and boiler on a wagon, which latter they have to drive without suffering from the shock of the locomotion on rough roads, new complications arrive which are infinitely more important and troublesome than most people believe who have devoted themselves to the study of this subject. We find early attempts to effect this compromise in a steam vehicle built by the Ericssons in England in 1830, who placed a vertical engine on the rear of their vehicle, and coupled it up with a long springy connecting rod to the front wheels, which acted as drivers, thereby preventing excessive shock being transmitted from the wheels to the engine.

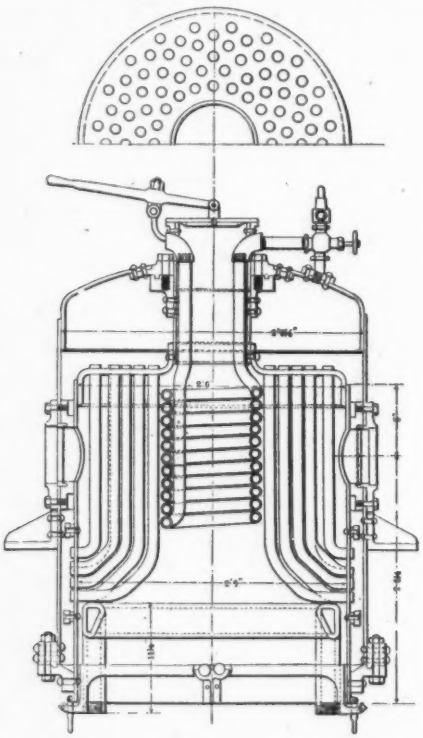
Tires and Wheels

Wheels in themselves are far more important problems than is generally believed. My opinion is, that at the present day no form of rubber tire will give satisfaction on a commercial wagon intended to carry a net load of, say, one ton or more. The rubber tire is not only expensive, but gives poor satisfaction under the combined action of great weight and speed. Attempts have been made to retain the desirable features of a rubber tire, protecting the latter with a tire shield of steel, dating back as far as the early '70s, but it would seem that such combinations are just as troublesome to maintain. Steel tires, if properly attired to stiff wooden wheels, have been proven to stand most severe work, and they afford the advantage of strengthening the wheels very considerably. It is my opinion, that well constructed springs of ample proportions, are, alone, the means to lessen the shock to which a wagon wheel is subjected. In the case of dished or cored wheels, which I consider to be best adapted for heavy work, a steel tire is indispensable, since it binds the wheel together and prevents the spokes from being torn out when striking an outer obstruction. There is considerable divergence of opinion as to whether a comparatively narrow tire or a wide tire should be used, whether the wheels should be small or large, and whether the front or hind wheels should be driven or steered. While it is a fact, even in the case of motor propelled vehicles, that the width of the tires should be smaller on hard roads and greater on soft roads (but not on sandy roads or in snow). I think that in the case of steam wagons the total width of the tires in inches should be at least twice the number of gross tons carried when small wagons are concerned, say of a capacity of 2 tons of net load; this coefficient of two, to decrease in the case of very heavy wagons to one, and even under.

Use of Small Driving Wheels

The reasons why small driving wheels seem to be exclusively used on motor wagons are mostly that it is difficult to design large wheels which will stand such severe strains as motor wagon wheels are subjected to. In this case the spokes of the wheel not only support the load, as in a horse-drawn vehicle, but they are more or less affected by the action of the driving power, and, moreover, there is also a tendency to twist them. With the ideal wagon wheel the power should be applied directly where the wheel touches the ground. In reality we drive on to a spur wheel, or chain wheel, concentric with the wheel, but, of course, of a smaller diameter, and such an arrangement makes it desir-

able that the wheel should also be small. Another reason making small wheels desirable lies in the requirements of the wagon, and the working of a high speed motor. In other respects it seems to me that a large driving wheel, say of 4-foot diameter, will answer much better than a 3-foot wheel, such as has been almost exclusively applied to steam wagons. I consider that not only will a 4-foot allow of a more powerful starting torque, but it will



Sectional Elevation of Boiler Designed by Mr. Herschmann.

also save the driving gear, seeing that it does not sink in as deep as a small wheel when it passes over a depression in the road.

Advises Rear Drivers

The argument presented by advocates of the "front driving" system is, that the wagon will steer a straighter course when the wheel strikes an obstruction, for the reason that the front wheels, in striking, tend to run over the obstruction, instead of being forced aside. I have seen such wagons steered behind and in front, and my opinion is that any advantage of front driving is more than outbalanced by the disadvantages introduced in connection with awkward location of the machinery. One of the early steam wagons was driven by all four wheels, and if such driving could be practically effected, I think it would prove an excellent feature of a wagon. There are, roughly speaking, two steering systems used—steering with a fifth wheel, and, secondly, steering with pivoted axle ends. It would seem that the fifth wheel steering arrangement is more adapted for heavy work, leaving the wagon axle unbroken. In reality, this system cannot be as satisfactorily applied as steering with pivoted axle ends. To effect the steering of heavy wagons, spur gearing of suitable purchase has to be used, or a worm and worm wheel device. The latter seems to answer in one of the best designed wagons, but I do not consider it as desirable as steering by means of spur gearing, since it locks the gear, and, besides, causes a severer strain on the wagon in case the front wheels strike an obstruction. In rounding a curve, the inner wheels necessarily describe a smaller circle than the outer wheels. To make this practicable, the steering device has to be correctly designed, and the two driving wheels have either to be driven by independent motors, or have to be linked together by means of a compensating gear, or, as it is often called, "Jack-in-the-box." It will be found that in a heavy wagon, particularly one using dished wheels, this driving and the arrangement of the compensating gear are rather troublesome, and that there is still great scope for improvement in this connection. The transmission gear, forming the link between the rear wheels and the engine, which is almost invariably in front of the driving wheels, I think can only be reliably effected by means of accurate spur wheels, immersed in an oil bath. With a steam wagon it is not necessary to use any kind of a clutch while running, seeing that the steam engine is a very flexible prime mover. Nevertheless, I think that a speed reduction gear, which can be best provided by means of two sets of spur wheels of varying diameter, one set stationary, the other movable axially on a square shaft, forms a desirable adjunct to the mechanism, to be shifted when the wagon is at rest, so

as to increase its traction power, and enable it to negotiate any special hill, or extricate the wagon from a bad position. We cannot deny that for many years to come greasy and hilly roads, or deep snow, will be the greatest difficulties to contend with. I attempted on a damp day to take a load of 4 tons up an incline of about one to twenty, covered with Belgian blocks, and there was trouble with the drivers racing. The engine was geared one to fourteen, and the wheels were of 3-foot diameter; in my opinion large and heavier driving wheels and a much lower gear would have taken the wagon up. With the slightest turn of the valve the engine, without difficulty, started and on account of the poor adhesion and the light machinery ran away before the inertia of the heavy wagon was overcome.

The Boiler and Engine

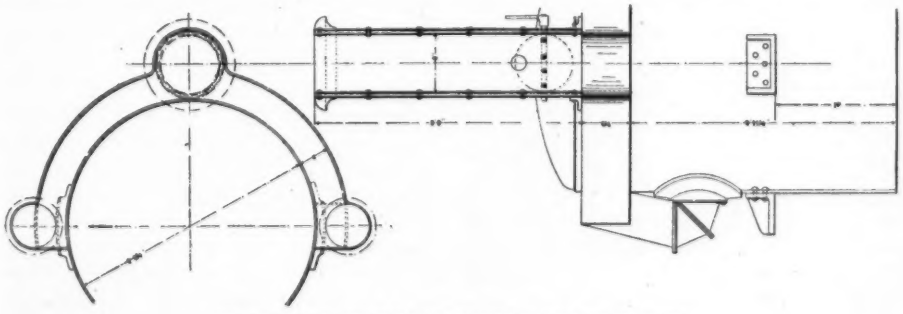
The next question we have to consider is the boiler and engine, machinery with which you are all thoroughly familiar. Among the steam wagons built so far one can notice a great variety of boiler designs. The desiderata of a suitable boiler for a motor wagon are that it should be of the greatest safety, of small proportion, quick steaming and economic. In addition, it should be of the simplest possible construction, and free from joints likely to work loose by jarring on the road. Pipe boilers, while perhaps a little safer than shell boilers, carrying little water, are, for the same reason, undesirable for the varying demands made of a wagon boiler. There are other objections to small caliber pipes; they are necessarily exposed to intense heat and liable to burn, and without a large dry tank they will make wet steam. A shell boiler, on the other hand, can be made of ample proportions, and, if well constructed, and watched during its use, should give no apprehensions as to its safety. The water level can be more evenly maintained, and this is a point of some importance. I consider a superheating device an all-round advantage, provided it is correctly applied to the boiler. (Figs. 5, 6, 7 and 8 show a boiler with details of flange and flue connections, designed by the author.)

In addition to the engine feed pump there should always be a second steam driven pump instead of an injector, which latter, when of small proportions, has not yet been made to give satisfaction on a wagon.

Coke for Fuel

The firing of a wagon boiler can be most easily effected by means of an oil burner, and with a steam governed burner the firing will automatically respond to the requirements. However, in addition to the inherent disadvantages of using oil, it is difficult to maintain the burner in good trim during all kinds of weather, and at this stage of perfection oil burners will "roar" and occasionally give trouble and make smoke. For the latter reasons coal and coke are preferable, being besides cheaper in use. Solid fuel can be conveniently stowed away, around the boiler, which latter is generally fixed in front of the wagon, and, if thus located, the stored fuel acts as a compressible safeguard to the boiler in case of a head collision. In using a shell boiler it is found convenient to fire through the boiler top, a system originally introduced into steam-wagon practice with the De Dion boiler.

The difficulties with which one has to contend in the use of steam wagons are that they will occasionally show a little



PLAN AND ELEVATION OF BOILER FLUES.

steam, and during a sharp frost it will be found difficult to prevent a pipe from being frozen up. "Blowing-off" will be found annoying, but this nuisance is largely caused by neglect of the driver and suppressible.

However, these are difficulties which will be overcome in time; using a condenser there will be practically no visible exhaust in all weathers.

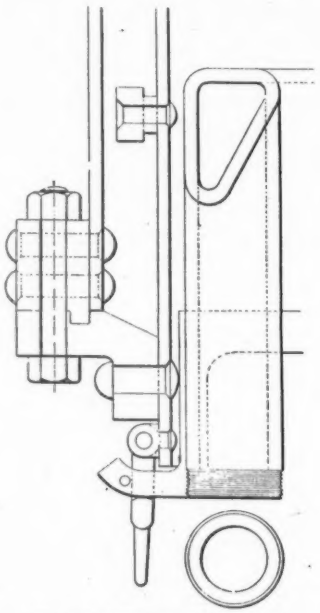
Condensers, however, are by no means desirable constituents of a motor wagon, and I should rather put up with an occasional cloud of steam than with a permanent shower bath due to leaky pipes and the difficulties in running a condenser. It can be well said that difficulties in connection with smoke have already been overcome.

Design of the Engine

The engine so far used is in almost every case a compound. If of vertical design it can be located under the driver's seat; while if of horizontal type it can be suspended from the body. In all cases a light and well designed, quick revolution engine will answer the purpose if it is fitted with a reversing gear and means to admit high pressure steam to the low pressure cylinder. The cylinder ratio should be larger than with stationary practice, seeing that the pressure used is higher, and that a large, low pressure cylinder means a powerful starting moment under live steam, and especial care has to be taken to connect the engine to the frame in an efficient manner. A fly-wheel is sometimes fitted, and then used as a brake wheel, but I deem it unnecessary. As regards the size of the engine I refer to tables appended.

Generally it can be observed that most of the wagons constructed are by far too light to stand the severe strain of their work. As can be seen from the attached tables relating to the running of a steam wagon, their cost of actual propulsion per gross ton is by no means as important an item as, for instance, in an electric vehicle, and one can, therefore, well afford to provide amply for a durable construction. A heavy wagon is just as easy to bring to a standstill as a light wagon; in fact, easier, since it may be fitted with quicker acting brakes, which, on account of their severe action, could not be fitted to a light construction. (Figs. 9 and 10 show a steam truck, built for the Adams Express Co. and designed by the author.)

The idea seems to prevail among some builders of steam wagons abroad that the driver should also effect repairs of the machinery, and that he should adjust the latter to suit himself. I rather think that this theory is against the economical ex-



Detail of Flange Connection.

ploitation of such wagons, more particularly if they are used in numbers.

In the latter case a concern would probably house a number of wagons in a shed at a distance from their center of work which would be too great to stable horses there. Such a shed would have facilities for firing up, taking aboard of hot water and fuel, dropping grates, cleaning, and maintaining, which operation could go on partly from below and without necessarily interfering with the handling of merchandise.

There would be a foreman capable of adjusting the machinery, or of replacing defective parts, and the driver would merely have to be competent to operate the controlling organs and to take care of his boiler. Radical improvements in the storage of electricity or of compressed gases, or relating to explosive engines, may yet put the steam wagon in the background; but judging from accomplished facts it is

so far the most successful wagon for the economical transportation of heavy loads.

I believe that if the motor wagon is given an unobstructed field and "fair play," it will hold its own and oust the horse-drawn truck in short order. The change must come, and with, perhaps, the exception of the harness-maker, everybody will benefit by it. The main trouble seems that educated engineers have so far had little encouragement given them to develop the motor wagon, and that the confused efforts of amateurs and stock-jobbers have drawn the attention of almost everybody to their work, except that of the transportation community, who had no accurate data before them to judge of the practicability of the motor wagon.

Opinions will, however, soon be decided and converge on certain lines, and this once being the case many a designer will be saved from exerting himself in a wrong direction.

(TO BE CONTINUED.)

The C & J Automobile Tire

The illustration shows a sectional view of the G & J automobile tire. The G & J tires are too well and favorably known to require extensive comment,. having demonstrated their high qualities to all who have used them. Owing to their necessarily expensive construction the bicycle tires made by this company did not become as rapidly and widely known as some of the cheaper brand, but to use a G & J was to swear by it with the result that there is now no more popular tire on the market nor one more deserving of its reputation. The same conditions of initial cost that affected the bicycle tires will no doubt be found in the introduction of the vehicle tires, but to a far less extent, as the original cost of a motor vehicle tire is of small moment compared with its resilience and wearing qualities. and it is on these points that the makers lay the greatest stress in their claims of superiority for their product. It is also claimed by the makers that owing to the quality of material used and the great amount of surface free from the rim, a greater mileage on a given amount of power can be obtained from them than from any other tire on the market.

The Chicago club has adopted a club pin which may be obtained of Wendell & Co., 57 Washington street.

THE G & J AUTOMOBILE TIRE.

SOME EXHIBITORS AT CHICAGO

The diagram appended shows the interesting condition of affairs in connection with the coming Chicago show which takes place at the Coliseum March 1 to 8. All of the black space has been taken. The diagram does not show the annex, which is to be reserved, if possible, for purposes of demonstration. It seems probable, however, that it will be found necessary to allot a part of the space therein, at least, inasmuch as there are but half a dozen spaces suitable for accessories now remaining.

The list of applicants to whom space has been allotted up to date is as follows:

Chicago Motor Vehicle Co.
Milwaukee Automobile Co.
Warwick Cycle & Automobile Co.
Overman Automobile Co.
White Sewing Machine Co.
Searchmont Motor Co.
Elmore Mfg. Co.
Ralph Temple Co.
Friedman Automobile Co.
Geneva Automobile & Mfg. Co.
Haynes-Apperson Co.
Winton Motor Carriage Co.
Ohio Automobile Co.
Baker Motor Vehicle Co.
Knox Automobile Co.
Chelsea Mfg. Co.
Foster Automobile Co.
George N. Pierce & Co.
Beardsley & Hobbs Mfg. Co.
Frank E. Glover.
Locomobile Co. of America.
American Bicycle Co.
DeDion-Bouton Motorette Co.
Steamobile Co. of America.
T. B. Jeffery & Co.
Bachelle Automobile Co.
National Vehicle Co.
Olds Motor Works.
U. S. Long Distance Automobile Co.
Electric Vehicle Co.
Merkel Mfg. Co.
Badger Brass Co.
20th Century Mfg. Co.
Veeder Mfg. Co.
Dixon Crucible Co.
Coe, Smith & Co.
Diamond Rubber Co.
Hartford Rubber Works Co.
K. F. Peterson.
P. J. Dasey & Co.
G. & J. Tire Co.
Brandenburg Bros.
Goodyear Tire & Rubber Co.
National Carbon Co.
B. F. Goodrich Co.

THE NEW LIGHT PANHARD CARRIAGE

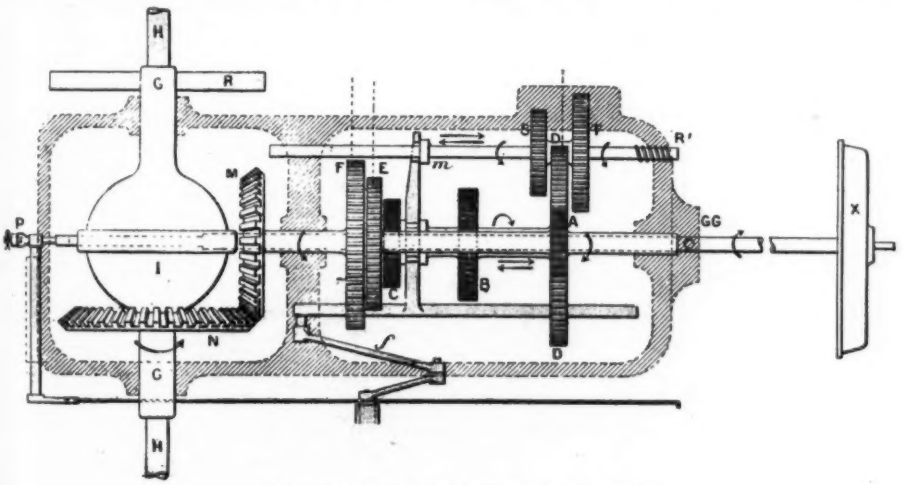
PART TWO. TRANSLATED FROM LA LOCOMOTION.

As has been already said, the speed and movement are operated by a single lever. This lever, P, ends, at its upper part, in a button connected with a rod, which, when pressed, disengages the lever from one of the five notches of the quadrant. The notch nearest to the seat corresponds with the backward motion. In succession are found the notches corresponding with the stopping, the first, second and third speeds. To operate the speeds it is sufficient to press the button, release the gear with the foot and push or pull the lever to the next notch.

Let us take down the eleven bolts that hold the cover of the gear-case and the mechanism lies before us. We are immediately impressed by the important simplifications of the gear-case. First is the abandonment of one of the beveled-wheels. The central pinion, M, is constantly in mesh with the wheel, N, without need of change. We notice that the diameter of the pinion is nearly equal to that of the wheel, this being important since the result is the decrease of pressure on the brackets. The constant meshing of the two parts involves the lateral immobility of the differential-axle and of the brake-drum, R. There are no removing levers, no nuts, no screw-drivers, no straps for the keeping in place of the brake's jaws. The axle-tree is now composed of two simple ends, HH, which are united by the gears of the differential, I, and bear, each, at its outward extremity, a chain-wheel.

The parts of the gear case are very similar to those of the larger Panhard. The shaft carrying the male portion of the clutch, and practically forming an extension of the motor shaft, is square in section in the length covered by the longitudinally slidable gears. The rear end of this shaft terminates in a lug P, and is surrounded by the spring which holds the clutch in action. The forked end of a lever, acting on the lug P, draws the clutch away from the motor fly-wheel, thus disengaging the clutch. A small oil cup, K, is provided for lubricating the pawl in the bronze ring of the fly-wheel.

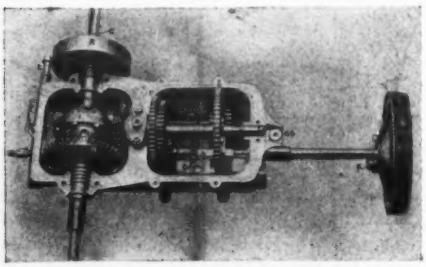
The change speed gears are coupled in sets of three, instead of four as heretofore, and on a shaft seated in the gear case, to the left of the secondary shaft, are two additional gears for providing the reverse



PLAN VIEW OF TRANSMISSION GEAR.

A B C, Gears on clutch shaft. *D E F*, Gears on secondary shaft. *G*, Gear case supports. *H H*, Axle of the differential. *I*, Differential. *M*, Bevel gear. *N*, Bevel gear. *P*, Clutch disengaging device. *R*, Brake drum. *R'*, Spring on reverse gear shaft. *S T*. Reversing gears. *X*, Cone on clutch shaft. *f*, Connecting rod moving controlling arm. *m*, Collar on reverse gear shaft.

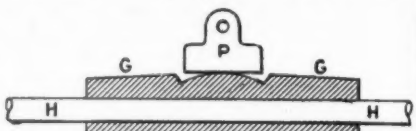
drive. The illustration shows the speed-changing gear in plan. Three gears, A, B and C, are slidably seated on the squared portion of the shaft running from the



Transmission Gear with Cover Removed.

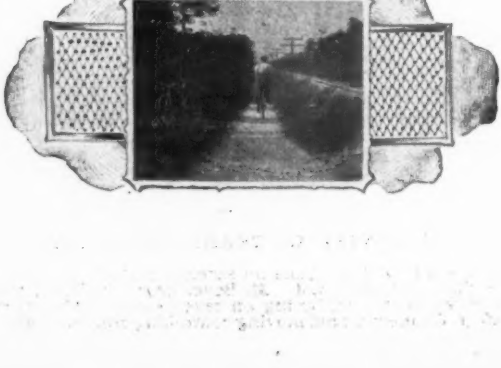
clutch. They are longitudinally movable by the controlling arm. The gear is of small diameter and B is the largest of the three. These three gears are rigidly seated on a sleeve, sliding on the squared portion of the shaft. Directly above this shaft is another, carrying three gears, D, E and F, of which D is the largest and E the smallest. The controlling arm of the slidable gears is moved by the inside rod, f. When the gear A is in mesh with the gear D, as shown in the illustration, the slowest speed is obtainable. When the hand lever is pushed forward to the next notch the gear C passes clear of E and meshes with F, which gives the second speed. If the lever is pushed to the third notch C is pushed clear of F and B meshes with E, which gives the highest speed. Under these conditions the upper axle, which gears with the differential, moves at nearly the same speed as the motor shaft.

The reverse drive is produced by the interposition of the gears S and T, mounted on a lateral shaft, journaled in the gear case. At the forward end of this shaft is a spiral spring, R, which tends to force it and the collar against the controlling arm. When the latter is moved beyond the stopping position it moves the shaft containing the gears S and T forward, compressing the spring R. This motion of the shaft brings the gears S and T in mesh with the gears D and A, respectively. In this condition the lower shaft from the clutch does not drive, directly, the upper one, through the gears A and D, but A meshes with T and transmits to the latter movement in the direction that would have been given the upper axle were A and D in gear. S and T being rigidly connected the motion is transmitted through S to the upper shaft,



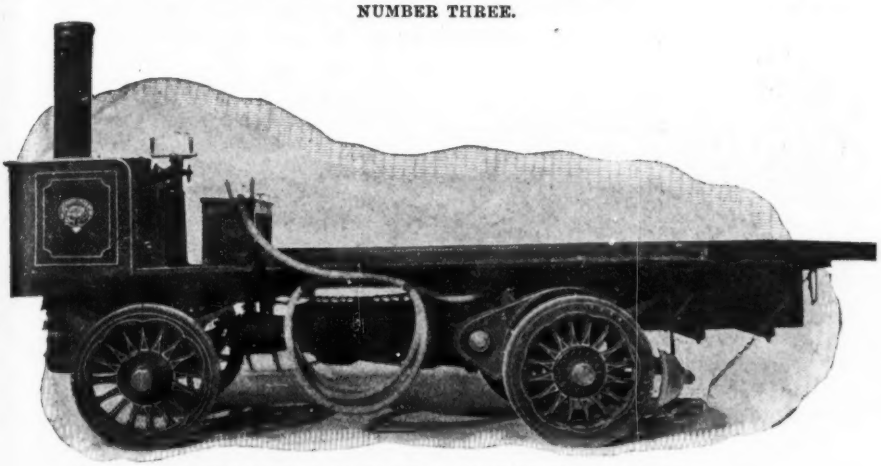
Bearing Supports of Transmission Gear Case.

through the gear D and in a direction contrary to its own. The gears M and N are thus revolving in a direction the reverse of the normal and the vehicle is driven backward. When the controlling arm is released and returns to the stopping position the spring R forces the gears S and T out of mesh and they resume their normal position.



GREAT BRITAIN'S HEAVY MOTOR WAGONS

NUMBER THREE.

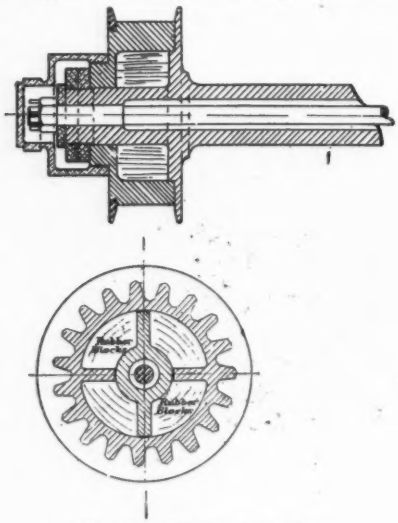


THE LEYLAND WAGON, WINNER IN CLASS B.

The Lancashire Steam Motor Co.'s wagon, known as the Leyland, was the only competing vehicle which was able to scale below the required weight of 3 tons (7320 pounds) in class B. The required load was not less than 5 tons; minimum level platform area, 75 square feet; minimum width of driving tires, 5 inches; speed 5 miles an hour. The Leyland is designed to carry a load of 5 tons, and is of the ordinary lurry type. The frame is constructed of channel steel and is carried upon the front and the rear axles by semi-elliptical springs. The axles themselves are of a girder form, and the road wheels are of the military type, with steel naves, oak spokes, and ash felloes. The vertical fire tube boiler is fixed in the front of the frame, as shown in Fig. 9; the water tank, which has a capacity of 138 gallons, is placed beneath the frame at its other extreme end. The boiler has 80 square feet of heating surface, and is tubed with tough seamless copper tubes. A fusible plug is fitted in the crown plate of the fire box. The boiler is fired centrally from the top, through a shoot fitted with a circular cover; and the draught is regulated either by the cover or by a hinged ash-pan, which can be adjusted by the driver. The funnel passes out from the top of the boiler in front of the stoking hole. Immediately behind the boiler is the throttle valve, a Klinger safety water gauge and a steam gauge being fixed to left and right of this respectively. The safety valve, which blows off into the water tank at 230 pounds per square inch of pressure, is placed on the right-hand side of the boiler immediately in front of the driver. The water-level has a range of 6 inches, and the usual steam blast is provided for rapid steaming, if necessary. The bunkers for carrying sufficient fuel for an ordinary day's work are placed on each side of the boiler. An automatic feed pump is driven off the differential gear shaft, and a by-pass, which returns more or less of the feed to the supply tank, is connected with a small hand-wheel on the seat to the right of the driver. A small steam pump is placed under the left side of the seat and can be used as an auxiliary feed if required at any time.

The engine, which is fixed horizontally underneath the frame, is a compound, having one high pressure cylinder of 3½-inch bore and a low pressure cylinder of 6¼-inch bore. The common stroke is 6 inches, and the normal speed 420 revs. per min. Provision is made for working both cylinders with high-pressure steam when required. The crank shaft carries a pinion at each end, and an intermediate shaft driven by it and fitted with two sliding and corre-

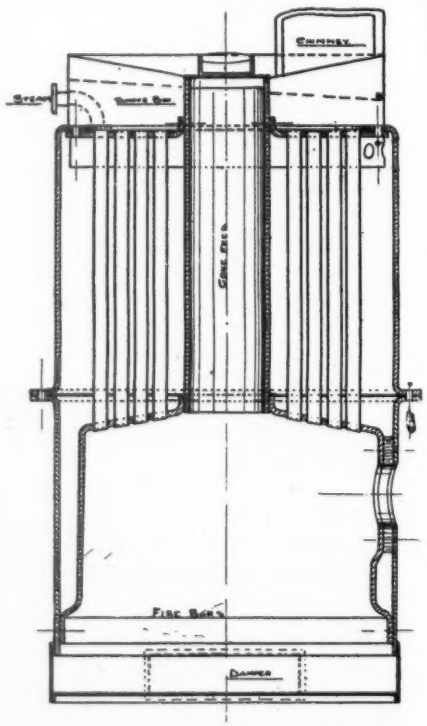
sponding gear wheels transmits the power to differential gear upon a transverse countershaft. The engine, the change-speed, and the differential gear are all enclosed in an oil-retaining and dust-proof casing. The bearings have long wearing surfaces of



The Flexible Chain Pinion.

large diameter, and are well lubricated owing to their position inside the crank chamber. The gear wheels which are all made of steel, have machine-cut teeth; they are fixed upon their respective shafts by means of flanges—no keys being used upon the vehicle. The differential gear shaft has several important features of interest, for not only is a flexible drive secured between it and the chain wheels, which it carries at its outer ends, but a central bolt passes through it from end to end and carries thrust pieces, which relieve its bearings from the effect of the spreading action of the bevel wheels. A further feature of this shaft is the arrangement which is made for locking the differential gear when necessary. The flexible drive is obtained by mounting the chain wheels loosely upon the ends of the countershaft and by the employment of rubber cushions between driving faces on the shaft and driving faces inside the chain wheels. By this arrangement much of the shock, when starting with a heavy load, is taken off the chains and other working parts, as the engine can make almost a complete revolution before its full power is exerted on the road wheels. The locking device consists of a sleeve which slides upon an enlargement of the one-half countershaft, near the compensating gear. The opposite half of the countershaft projects inside this enlargement and the parts are so shaped that the movement of the sleeve clutches the two half shafts together. A hand-lever is placed under the frame of the vehicle for operating this device.

The power is transmitted from the countershaft to the two road wheels by means of Hans Renold's silent chains, which pass round large chain wheels secured to their felloes close to the tires, and thus relieve the spokes of all driving strains. The change-speed gear lever and that for working the reversing gear are placed side by side and work in quadrants in the seat to the right of the driver. The former has three positions—one for each speed and an intermediate free engine position—and the latter gives three different cut-offs forward, one reversal and one neutral point. The steering gear is of the usual Ackermann pattern with irreversible worm; it is arranged in connection with a vertical pillar



Section Through Boiler.

in front of the driver. The angle of lock is 33 degrees. A second and similar pillar (to the left) is connected by a chain to a

swinging crossbar which carries a pair of blocks behind the tires of the driving wheels; the chain passes centrally above the engine and draws the blocks up against the two tires equally. The water tank is provided with a removable strainer, with a steam water lifter, and with 40 feet of suction hose.

The Product of Nature's Factory

Gasoline: its possibilities; its origin; its dangers—all these things are little understood, even by people who use it every day. The automobilist knows as little as anyone about nature's process of forming the fluid fuel which enables him, with so little effort, to annihilate distance. Here are a few entertaining facts:

When plants lose the element of life and remain exposed to oxygen of the air their substance sooner or later becomes reduced to carbon dioxide and water, except a small percentage of mineral matter. But if the decomposition takes place under water the carbon does not become oxidized. Some hydrogen is taken up and the mass becomes a hydrocarbon.

If this macerated wood is carried by currents into still water, and as much as 8 feet in thickness of this pulp settles quietly to the bottom, and upon this is deposited clay and other rock-making material, in time the eight feet of carbonaceous matter may become one foot of coal.

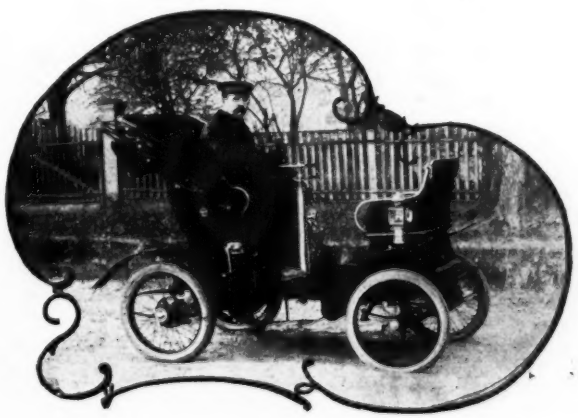
But if, instead of being deposited separately, both materials were carried simultaneously and intermingled, the deposit would finally become a bed of blue shale, the degree of color depending upon the proportion of carbon to clay. If the mass were 10 feet in thickness it would contain one foot of coal scattered in minute particles through its mass.

Pressure producing heat would change the condition of this hydrocarbon in the shale into heavy oil, light oil or gas, according to conditions of heat or pressure.

If the heat exceeded that necessary to convert the carbonaceous matter into oil sufficiently to vaporize it also, in this condition it would ascend from the shale bed and be condensed into oil if caught in any suitable container above the shale, as in the porous sandstones of anticlinal ridges when covered by other shales or impervious limestones.

But if the heat were only sufficient to produce the oil, but not volatilize it afterward, it would as fluid seek the valleys instead of the ridges. The product, also, of the ridges or anticlinals differs from that of the valleys, the former containing more illuminating oils.

This is what nature does, and she turns over to man an ill-smelling, dirty-looking, thick, brown-colored, semi-liquid stuff which is crude petroleum. Man takes the mess, treats it by refining, distilling, bleaching and in various other ways turning out a variety of products, many of them, like paraffine wax, for example, being seemingly in no wise connected with the thing from which it is derived. Among the many other products, gasoline and naphtha are produced, and to them, more than to any other one thing, is the present vogue of the motor vehicle due.



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FROM CORRESPONDENTS

Racine Junction, Wis., Dec. 12.—To the Editor: We notice in last week's issue of your paper that a party by the name of Birch, at Mineola, L. I., is making motor cycles, using, among other motors, the Mitchell. We wish to state emphatically that you have been misinformed on this point. More than 90 per cent of the break-downs of motor cycles have come about by people attempting to mount a motor upon an ordinary bicycle frame, and a still larger percentage of the dissatisfaction arising among users of motor cycles has been brought about by trying to use machines of this sort, consequently we absolutely refuse to sell our motor and equipment to be used in this way. Our complete motor cycle, as put out by us, goes with our absolute guarantee that it will work in a satisfactory manner providing our customer operates it according to instructions which we send out with each machine.

There is not a day but what we receive from one to fifty inquiries asking if we will sell our motor and equipment to be placed upon the ordinary bicycle, and while we are not a firm that turns down good business we do feel that this is not good business, and that to handle such will do more harm than good, consequently we always refuse it.—Yours, etc., Wisconsin Wheel Works.

Difficulties of Lubrication

Colorado Springs, Col., Dec. 11.—To the Editor: I am in difficulties with the oiling of crank pins on my double 5x5 horizontal gasoline motor, opposed cylinder type, cranks at 180 degrees, enclosed crank case, which I intend using in a special automobile. The motor is of a tried, successful design and the workmanship and material are first class in every respect. There is nothing to be desired in cylinder boring and fitting of pistons and rings; the compression is perfect (compression space 30 per cent of piston displacement). There are three rings, ½ inch wide each, at head end of piston; none on the crank end. There is no chance of oiling crank pins through the shaft, as one end of the same runs necessarily too close to the lay shaft of the transmission gearing while the other end must be free to receive the starting crank; therefore there are but two methods available for oiling these parts: one by cutting away the closed crank case at the top sufficiently to provide clearance for oilers to be carried on crank pin ends of connecting rods, and the other by carrying oil in the crank case. The first method I do not like, as it involves weakening the present crank case or the making of a new crank; and in either instance there is the objectionable feature of carrying oilers on a very high-speed short-throw crank.

On running the motor by belt, with gas engine oil in the crank case, I find that the oil works past the piston rings into the combustion chamber freely, whether the crank case is run tightly closed, with a vent on, with a check valve, opening inward. Just enough oil was used so that connecting rod ends dipped ½ inch and the motor was run at only 350 revolutions. All results indicate that a mixture would be hopelessly spoiled and ignition (jump spark) practically defeated by attempting to carry oil in the crank case, but I have not yet run the motor by its own power under these conditions.

To prevent crank case oil from working back into the combustion chamber I have thought of making new pistons with an additional ring placed over the open end of the cylinder with a slot in same just wide enough and long enough for the connecting rod to play in; the plate tending to keep the oil from splashing into the cylinder. I have also thought of adopting a suggestion received from the description of the Columbia Mark VIII gasoline vehicle, namely, to run a groove around the cylinder bore one-half way down from the top with either end terminating in horizontal grooves, these grooves to be fed by a cylinder oiler; then to use a hollow wristpin to take up oil from the horizontal grooves for the lubrication of the wristpin and passing the oil along to the crank pin through a hole drilled lengthwise through

the connecting rod or by means of a small pipe carried on the rod.

Any suggestion that you may make in your valuable journal to assist me in this matter will be gratefully received by an interested subscriber.—Yours, etc., C. E. Palmer.

From the conditions stated we conclude that the troubles are overestimated, and would not be encountered were the motor run by its own power. The trouble usually found in motors with splash lubrication is a lack of proper cylinder lubrication rather than an excess. When the motor is run by an external power with a vent at the cylinder end, the pressure is all in the direction of the compression chamber and the natural result is the flooding of the cylinder. Mr. Palmer has probably been running his motor with the plug removed, or some other vent provided; it would be difficult to start with a belt with the cylinder tightly closed. On the other hand, when the motor is driven by its own power the pressure is exerted in an outward direction and during combustion is, of course, high. A popular method of lubrication is to feed the oil into the cylinder below the lowest point reached by the piston head and the internal pressure forces sufficient oil into the crank case to oil the bearings on both shaft and connecting rod.

The method spoken of in connection with the Columbia motor is quite satisfactory in effect, but is somewhat expensive in construction. As to the plate over the cylinder, it is unnecessary and the majority of motors built with the idea of splash lubrication are so constructed that the piston passes beyond the end of the cylinder when at the extreme of the outward stroke, which would, of course, prohibit the use of such a plate. Taking all into consideration we are, as originally stated, of the opinion that the trouble will not exist when the motor is run in the usual way. We shall be glad to learn the result of such a test.—Ed.

Plans for a National Association

Cleveland, O., Dec. 16.—To the Editor: I have read with great interest, as will, I am sure, every subscriber who has the good of the automobile and automobilism at heart, your remarks on the subject of a national association. By all means the most practical thing relative to the subject that has appeared is the article in your last issue, which has just reached me. I have given some thought to the subject and, although I doubt whether I could take an active part in the formation of an association, should be glad to be numbered among its charter members. May I be permitted to express a few views on the subject in the hope that they may lead to something definite?

To begin with I feel that you are right in the statement that every owner of a vehicle should be eligible to membership. I cannot see how it is possible for a club in New York to rule the sport, especially in view of the fact that that club charges a heavy fee for membership and is so exclusive that it requires applicants to be personally known to at least one member of the board of governors. We may just as well decide that a man must be personally known and indorsed by some member of congress before he may be permitted to vote at a presidential election.

I am a believer in a national membership at a nominal fee. Five dollars would be plenty. It might be less with advantage, for, as you say, there is merit in numbers. It does not follow because a man has money to buy an automobile that he desires to spend a lot more on the sport, or any other object the association may have. I believe in encouraging all to come in. If individuals are to be admitted at $5, make the club fee $3 per member. In other words, let clubs be encouraged to bring in all their members at a lower fee and let automobilists be encouraged to join clubs by all means possible, this one among the rest.

I believe there should be state organizations, such as we have here in Ohio. You may gather from my remarks that I am familiar with the methods pursued in the League of American Wheelmen. I am, and have watched the progress of that organization for years. I can conceive no better way of securing representation for all than by the same methods. I am a believer in an annual meeting for the election of officers, the discussion of national issues, and so forth. I believe that every summer there should be a meet of automobilists, of national importance, with races and such other attractions as the officers may de-

vise. I am a believer in participation in all matters pertaining to road improvement. We can do much more than the cyclists ever did—though they did a great deal—because automobilists, as a class, are older men and perhaps better fixed financially. They are in closer touch with the men who make laws and to whom we must look for assistance in the matter of appropriations.

By all means let us have a general meeting. If Chicago show time is too late, or the distance too great, let us go to Buffalo or any other central point. I am of opinion that Chicago would be the place, and the week of the show the time, unless the powers that be are afraid that the show would be so great an attraction as to prevent a good attendance.

Finally, I don't believe in making racing the whole thing. That is only one of the matters to be covered. We need roads worse than we need race tracks, and I trust the association, if one is formed, will insist in placing this matter of good roads in the hands of the strongest and best men the body will afford.—Yours, etc., M. S. Arthur.

Chicago, Ill., Dec. 16.—To the Editor: Do we need an association? Haven't we enough clubs? Cannot they, by arrangement one with the other, do all that an association can do? I am afraid that by breeding too many cooks we shall spoil everything and try to make men take part in so many formalities that they will care little for any of them. In other words, I want to encourage local clubs and believe that they can do a lot of good if they go at it energetically, but that the club men will not devote the time necessary to the formation and up-keeping of an outside association. If the Automobile Club of America wants to make rules why not let it? We, in Illinois, are not bound to be governed by them if we don't want to. I don't suppose that a Chicago man will go to New York to race once a year. So what does he care what they are doing in New York? If we must have racing rules in Illinois let the Chicago club make them.—Yours, etc., A Chicago club man.

The writer has undoubtedly overlooked the fact that, though Chicago men may not care to go to New York they may be glad to have New York men come to Chicago. And not only New York men but foreign visitors and men from other American cities. Should the A. C. A. be allowed to legislate as it pleases no one will be eligible to compete unless under its rules, and even now they provide that men who compete at meetings which the club does not "recognize" cannot compete at those which it does. An understanding of some sort is necessary.—Ed.

About the English Shows

Brussels, Dec. 3.—To the Editor.—My visit to the English shows was not the first. I think there was much greater enthusiasm over the bicycle than in the last 2 or 3 years. While it seems that in America as well as in France, the popularity of cycling is on the decrease, it certainly will show an increase in England next season. The many novelties in frames, the improvements of free wheels, hand brakes, etc., has brought the cycle to about the same level as the automobile and the manufacturers are quite jubilant.

While the English machines are not yet exact copies of the simple Yankee models, the makers are making improvements on the lines of American machines. The latter were not strongly represented at the shows. Some of your makers spoil their business by equipping their machines with single tube cemented tires. Fully 70 per cent of the cyclists in England use detachable tires. A few use American double tube and a still smaller number are using the single tube. These will never become popular and your makers should have been able to find this out long ago.

I must also express surprise that but few American manufacturers exhibited. These two shows are the most important in the world, and attract bicycle dealers and foreigners interested in the bicycle line, from all over Europe, and also Australia and New Zealand. I know of several English firms which received large orders from continental and Indian houses and think that some of your large makers could secure some pleasant orders if they would exhibit. They have the stuff and can make better prices than any other makers in the world.

Another line your countrymen could do well in is in bicycle accessories. It is very

probable that some of the great manufacturers of such articles have samples with their agents, either in London or other large cities, but this is not sufficient for such an occasion. They should exhibit on a large and attractive scale.

As to the automobiles, there are dozens of different patterns, and while English makers have not yet attained such speed as some of the French, they are making some very handsome automobiles. For my part, I think there will be but three great centers for the making of automobiles: France, England and the United States. Germany has quite a number of large concerns, so has Belgium. Italy has now a very large maker. There are a few in Austria, but the vehicles made in those countries will be for home supply and not for foreign markets.

I would strongly urge that some way be found to prevent your manufacturers making "trashautos" or "junkautos" as they did in the bicycle line. It would be a hard blow and not as easy to recover from as when bicycles were concerned. —Yours, etc., A. T. M.

How to Clean a Motor

Brooklyn, N. Y., Nov. 30.—To the Editor: Please tell me how to clean a small bicycle motor. After running some time the cylinder oil gets black and thick. How am I to get it out? If I open the hole in the crank case only a part of it will come out and the walls and the fly wheels will remain covered with it.—Yours, etc., Max Klemp.

Pour a quantity of gasoline into the crank case and run the motor by hand. Under no circumstances try to run it in with the spark The gasoline will remove the oil.

Urges Use of Southern Gauge

Orlando, Fla., Dec. 5.—To the Editor: The mishaps of a beginner would fill an issue of your paper. I run a steam machine and forgetting the water was my first trouble; not because my by-pass was closed but because I would run twenty miles or more and forget about the distance. Of course it always happened that when I burned my boiler I had a lady with me!

Last June I undertook my first long trip, from Milwaukee to Marietta, Wis., and had trouble galore. The second day I broke my chain five times, not knowing that I made three tracks instead of two! I did not discover the cause of the trouble until all my chain repair material was used up. There is only 8½ inches between the sprocket and the ground. I supposed that as long as I cleared in front I was O. K. and for 50 miles had been making three tracks in the many places where the roads were being rebuilt. And in June nearly all the roads of Wisconsin are high in the center.

My advice to all amateur automobilists, when undertaking long distance trips, is to take along a chauffeur. My advice to makers of vehicles of all kinds is to cater to southern trade but to have the southern gauge. This is 5 feet. On the poor roads of Florida it is quite impossible to use the northern gauge.—Yours, etc., Herman E. Benedict.

Experiences of Novices

Berlin, Wis., Dec. 3.—To the Editor: The most annoying thing that I ever had happen was to get brass and iron chips clog up the valve checks so pump will not work. This happens when the rig is new, and I believe that manufacturers are not careful enough in cleaning out the pipes and fittings from all foreign substance before assembling. Another very careless incident that may occur with the operator, unless he be very thoughtful, and I have known it to occur with several, is when, with a steam rig, your gasoline gives out, you get out and the very first thing you think of is getting gasoline. You start out and find some and immediately commence to pour it into the tank, and then pump up your pressure, thus forcing the gasoline into the burner, as you forget to close the burner valve. Of course the burner, being hot, the gasoline immediately forms a gas and when the operator lights his fire the results are disastrous. I think, too, that all automobiles ought to be equipped with a double action brake, one that will brake in backing up, as well as going forward.—Yours, etc., J. B. Deibler.

LATE EFFORTS OF DESIGNERS

The mechanical world has long since become used to ever-recurrent but slightly successful rotary steam engines, but gas engines of this type are far from common. However, in these days of striving for development and improvement in hydro-carbon motors, it is inevitable that some attention should be given to such a device, and while several of more or less promising appearance have gone the way of the patent office, it is the opinion of a number of mechanical engineers who have had an opportunity to examine it that the motor designed by Frank C. Watson, of Philadelphia, is, in many respects, far ahead of its predecessors.

Mr. Watson has devoted the greater portion of his life to mechanical pursuits and is at the present time assistant superintendent of bridges of Philadelphia. He has been working on this motor for some time and now considers that he has brought it to a high degree of efficiency. The motor is extremely simple, having but one valve and but one large moving part, that being the cylinder which forms the explosion chamber, and this acts as a balance wheel and receives the impulse direct, rotating with a

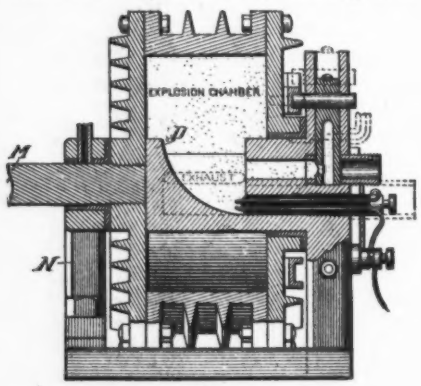


Fig. 1.

continuous motion and carrying the driving shaft with it.

The points of excellence claimed are quick and positive introduction of the gas, the complete ejection of the burned gases so that each charge is a perfectly fresh one, and the easy access to the interior of the motor. In the illustration Fig. 1 is a sectional elevation on the center line of the driving shaft and Fig. 2 is a diagrammatic view showing the action of the wings or buffer plates that receive the impact of the explosion.

It will be seen that the shaft is secured into one side of the rotary cylinder and merely forms a journal turning with the cylinder and rotatably supporting same in

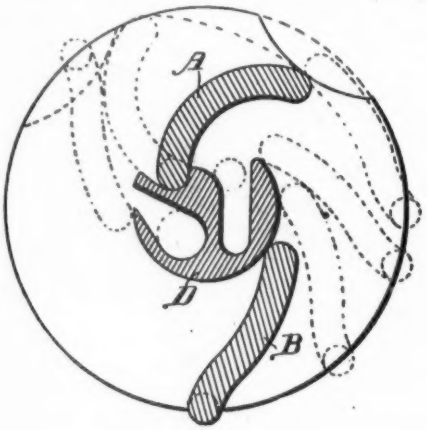


Fig. 2.

the bearing support, N. This support is readily removable, and is removed when it is desired to have access to the interior of the motor. What corresponds with the bearing support, N, on the opposite side, is a fixed standard having a stationary bearing shaft, D, which projects into the rotary cylinder. This shaft is of peculiar construction, being recessed to form an exhaust port, a gas inlet port, and an opening for the ignition plug, all of which ports or openings extend through the standard. Within the standard is a slide valve controlling the gas inlet, and this is raised and lowered at each revolution by a cam track carried by the rotary cylinder and in engagement with a pin of the valve slide. In a similar manner a lever is operated at the proper point of the revolution to make and break an electrical circuit which will cause a spark at the electrodes in the ignition plug. The most important novel feature of the invention resides in the wings A and B, that receive the impact of the explosion,

in that wing A is hinged to the fixed shaft D, while the wing B is hinged to the rotary cylinder. The pivots or shafts carrying these wings have each a lever on the exterior of the motor, to which is connected a spring. The spring of wing A causes its free end to bear normally against the rim of the cylinder, while the spring of wing B causes its free end to be pressed against the fixed shaft D. A lug or abutment is formed on the interior of the cylinder rim and engages the wing A, as shown in dotted lines. As the lug passes over the end of the wing it carries it forward, thereby compressing the gas. At this point ignition takes place, and the impact of the explosion is against wing B. The wing A being free of the lug, this spring returns it to position number 2, to receive the lug as before. This return of the wing A brings about the prompt and effective suction necessary to quickly charge the motor.

Holyoke Running Gear

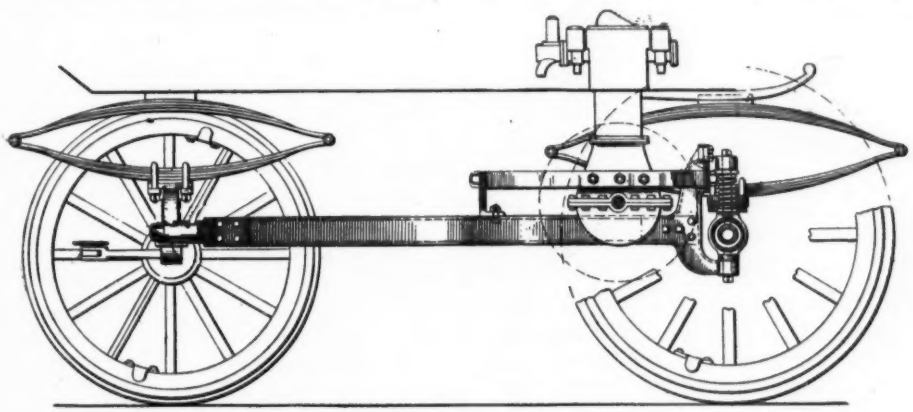
C. R. Greuter, of Holyoke, Mass., was, in the early part of the present month, granted a patent covering the running gear used in the Holyoke vehicles. The leading feature of this frame is a pair of auxiliary springs which support its rear portion, thus giving an elastic support to the motor, independent of the springs which support the body. The frame, which is essentially triangular in form, is constructed of channel steel. The main frame consists of two steel channels joined at the front to a projecting neck which is pivotally supported in the front axle. To the rear end of each of these channels is secured a yoke the extending forks of which receive vertically extending arms secured to the rear axle and are allowed a vertical movement thereon. Surrounding the upper arm is a spiral spring which supports the yoke and tends to hold it in its uppermost position. An auxiliary frame supporting the motor is arranged with its bearing points bolted to the main frame. The body may be supported by springs of any preferred pattern, directly from the axles.

The Fillet Carbureter

Since the introduction of alcohol as a fuel for internal combustion motors in France a demand has been created for a carbureter that is adaptable to either alcohol, gasoline or a mixture of both. As a matter of fact the difficulty of the problem lies not so much in securing a proper mixture of alcohol and air as in the employment of the hydro-carbon in a form that will prove the most economical and overcome the troubles incidental to the use of pure denaturised alcohol.

The Fillet carbureter, which was shown at the recent exhibit of alcohol motors in Paris, is said to solve the problem in the most effective manner of any so far devised.

It is claimed that this apparatus will use any kind of liquid fuel, but its chief merit lies in its adaptability to kerosene and alcohol, or a mixture of the two. There are two objections to the use of alcohol, one being its higher cost as compared with gasoline, and the other the trouble arising from the burning of non-volatile constituents on the valves, while if the alcohol



THE HOLYOKE RUNNING GEAR.

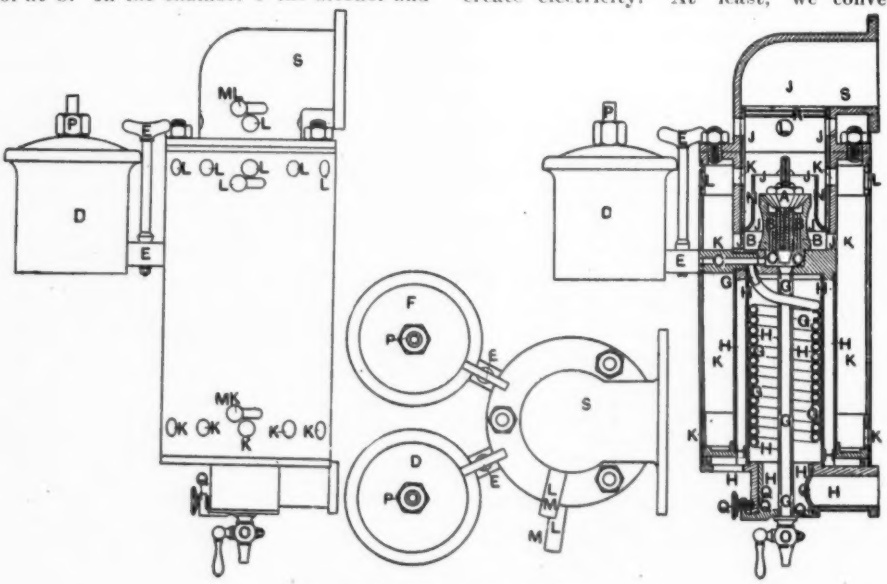
is not entirely vaporized the valves become corroded. The designer claims to have overcome both of these objectionable features by devising a carbureter that will allow of a mixture of alcohol and kerosene by means of which the lower cost of the heavy oil compensates for the higher price of the alcohol, while the kerosene serves to lubricate the cylinder and prevent a deposit on the valves. The constructive cost is no doubt somewhat higher than that of a number of the ordinary carbureters now in use, as the number of parts is considerable.

There are two flat chambers, one at D for alcohol or gasoline, and the other at F for kerosene. They communicate with the carbureter by separate pipes, opened or closed by the taps E so that either may be cut off if it is desired to use but one liquid instead of a mixture. Supposing that a mixture of 75 per cent alcohol and 25 per cent kerosene is to be used, the alcohol passes along the tube C and around the pulveriser, enclosed in the walls E, and finally strikes the striated cone A, where it enters the carbureting chamber J in an atomised condition. Meanwhile the kerosene has been passing along the coiled tube G, where it is warmed by the exhaust which enters at H and circulates around the coil. The kerosene then rises in the center and thoroughly mixes with the alcohol at C. In the chamber J the alcohol and kerosene mix with air introduced by the apertures L and K, the former admitting cold air while the air from K is warmed by the exhaust, which passes between the outer cylinder and the petroleum coil. The admission of air is regulated at M L. The mixture then passes up through the filter R and thence into the combustion chamber by way of S. At O is the drip tap for drawing off the residuum from the kerosene coil. Q is a screw for regulating the amount of the exhaust admitted to the carbureter so that more or less heat may be absorbed by the coil as desired.

Apart from its utility in using alcohol under economical conditions this carbureter has the advantage of being able to employ kerosene alone and this, in fact, is the primary object of its construction.

The Causes of Combustion

Combustion is a chemical process, by reason of which heat is liberated, the heat liberated being used, says Electricity, for any purpose for which it may be required, such as warming, cooking, or the conversion of water into steam. Whatever the method of combustion may be, the quantity of heat liberated is perfectly definite, though it is very rarely that the whole of it can be used for the purpose for which it is liberated. It must be understood that we do not create heat, also that we do not create electricity. At least, we convert

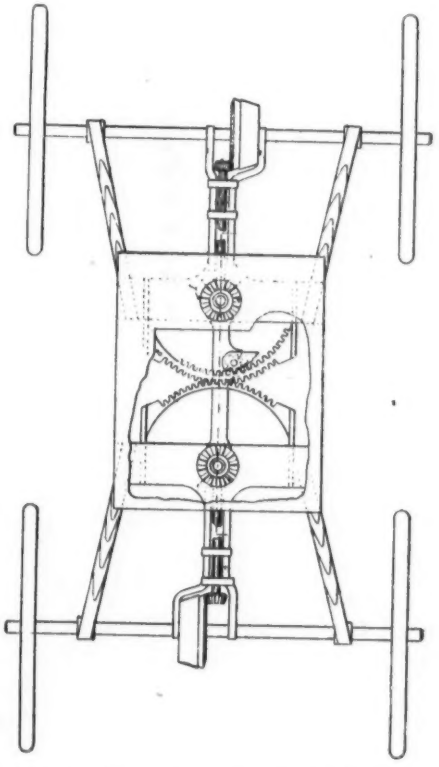


THE FILLET CARBURETER.

some other form of energy into heat, or into electricity, and when the term is used in that sense, we may say that we generate heat or electricity. In the case of heat, however, it is more often true that by some process of combustion we liberate a certain definite quantity of heat. According to the laws of the conservation of energy, the quantity of energy and the quantity of matter in the universe are both fixed. We cannot create either, and we cannot destroy either. All matters exist in one of three forms, the solid, the liquid, or the gaseous, and the form it assumes depends largely upon the quantity of energy—usually in the form of heat—of which the body is possessed. Solid bodies when heated sufficiently, in certain cases, become liquid, and if heated still further, become gaseous. That is to say, if heat is added to certain bodies which are normally in the solid form they will become liquid, or gaseous, and conversely, if liquid or gaseous bodies are induced to assume the solid form, a certain quantity of heat, for which they have no use, is liberated. In addition to this, however, there is a distinct difference between the heat required by each body in order that it may exist in a certain state, and this is particularly true of gases. Hydrogen gas absorbs a very large quantity of heat in order that it may exist as hydrogen gas, and will render up that heat if it ceases to be a gas. Oxygen gas also requires a large quantity of heat, though not as much as hydrogen. Carbonic acid gas, on the contrary, and steam, do not require so much as either of the gases mentioned. Hence, if the oxygen of the atmosphere can be induced to enter into combination with the carbon in coal, or one of the other forms of fuel, heat is liberated, and this is what is done in any form of combustion, whether it is that of coal, petroleum, coal dust, or the ordinary domestic illuminating gas, the gas met with in coal mines, or gas produced by the blast furnace, or by one of the producer gas-making processes. In each case the carbon—which forms the principal constituent of the fuel—combines chemically with the oxygen which is supplied to it, with the result that carbonic acid gas is formed and heat liberated.

Goodrich's Four-Wheel Drive

O. A. Goodrich, of Sioux City, Ia., is the designer of a running gear in which steering and driving is by all four wheels. The front and rear portions of the frame are identical in form and are pivotally secured to the body or a plate on which it rests. The two sections of the frame are triangular in form and are provided at their apexes with geared segments which mesh and compel a like movement in the two portions of the frame. The pivotal connections of the two parts of the frame are tubular and through them pass the axial shafts of two pairs of bevel gears which form a part of the power transmission. Extending from the center of each frame to the center of its axle is a shaft carrying at each end a bevel gear. One of these gears meshes with the bevel gear journaled in the pivot and the other with a bevel gear secured to the differential gear case; thus motion applied to the upper gears of the two pairs above mentioned is transmitted to the wheels.

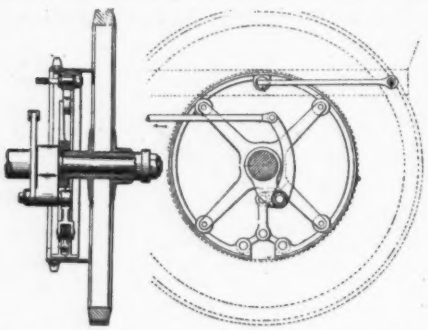


For steering, the inner face of the geared segment attached to the front frame is provided with gear teeth with which is engaged a pinion secured to the stationary portion of the frame and actuated by a steering wheel.

To allow for deflection of the axles due to yielding of the springs each shaft is fitted with a universal joint.

Powerful German Brake

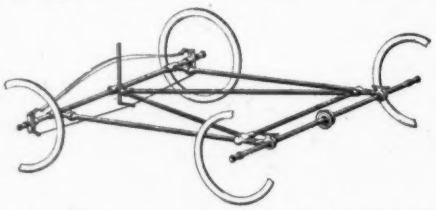
Wilhelm A. Maybach, of Cannstadt, Germany, assigns to the American Daimler company an American patent covering a brake which is, in fact, a powerfully built expansible ring clutch acting within an annular flange secured to the road wheel. It is intended that this flange shall be an integral part of the sprocket by which the road wheel is driven and may be secured to the wheel



by bolting to the spokes or otherwise. Seated on the stationary portion of the axle is a carrier, consisting of four arms, on which is seated the expansible ring. Pivoted to a lug on the axle is a bell crank, the short end of which actuates a toggle joint serving as a spreader for the ring. To the upper arm of the bell crank is secured the connecting rod from the operating lever. To hold the ring against rotation when expanded against the flange a rod is pivotally attached to the top of the ring and extends thence to the body of the vehicle.

Morgan's Flexible Frame

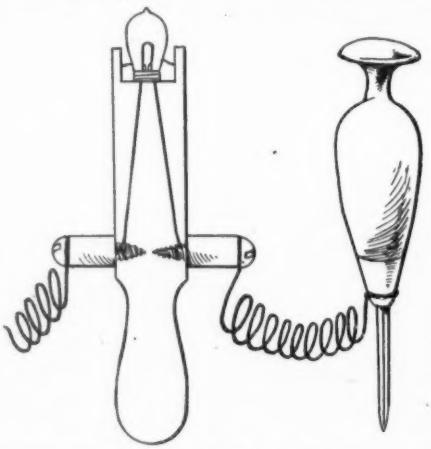
A patent recently granted to Ralph L. Morgan, of Worcester, Mass., and assigned to Charles R. Flint, of New York, covers a running gear which is of practically M shape in the horizontal plane of the axles and attains its flexibility from ball and socket or similar universal joints in the side members. The apex of the triangle formed by the two central members is supported by a horizontal pivot, passing through the front axle. Across the frame, slightly in front of the rear axle, is a transverse strut and in the projecting ends of this strut, in line with the outer members of the frame, are the socket portions of the joints at the rear ends of the side bars. Extending rearwardly from the front axle are stubs containing the socket portions of the front joints and extending between the two sockets at each side



of the frame are the side bars, the ends of which form the ball portions of the universal joints. By this construction either axle may be moved in a vertical plane without causing torsion in the reach members of the frame.

A Circuit-Testing Device

An English autoist suggests a novel device for locating breaks in the primary circuit of electrical ignition outfits. It consists primarily of a cylindrical wooden plug, in one end of which is set a 4-volt lamp and at the other end two binding posts connected with the terminals of the lamp. To these posts are connected two wires, one about 2 feet long, to the other end of which is attached the blade of an ordinary awl. The other wire should be of sufficient length to reach from the battery



to any point in the circuit and may be arranged in any way convenient for attaching to the battery when in use.

To locate a break disconnect from the battery the ground wire and attach in its place the free wire of the tester. Then with the point of the awl follow the circuit from

the other terminal of the battery and if the wiring is intact from the battery to the point of contact the lamp will light. In this way the circuit should be followed from the battery to the contact breaker, when, if no break is found, the contact should be made at this point and the test continued till the break is found, when the lamp will of course fail to light.

Light Gasoline Carriage

James J. Norton, Lowell, Mass., sends a picture of his carriage, which he describes as follows:

The accompanying photograph illustrates a light gasoline carriage. It is of the four-cycle type, air-cooled motor, and fitted with a 3½ horsepower motor. The weight of this carriage is 365 pounds and it is capable of a speed of from 6 to 20

miles per hour, and will climb any ordinary hill. It has two speeds forward, one for hill climbing, the other for regular speed. The springs run from axle to axle and all the machinery is hung on those springs, as well as the body, except the front part of the motor, which is supported on the front axle, which gives the motor opportunity to vibrate with the springs. I find very little vibration in this construction.

This carriage is very simply constructed and there are no parts that would cause trouble. It is equipped with 2-inch tires and steel rims. The writer has given this machine a thorough test and finds it very satisfactory.

Exports of Bicycles

Washington, D. C., Dec. 11.—The figures showing the exports of bicycles for the week just ended from the port of New York are as follows:

Argentine Republic, bicycle material, two packages, $223. Antwerp, bicycle material, 123 packages, $1,085; one package, $50. Alexandria, bicycle material, eight packages, $100. British Australasia, bicycles and material, seventy-three packages, $3,054. Brazil, bicycle material, two packages, $50. British West Indies, bicycles, eighty-two packages, $658. British East Indies, bicycles, fifty-five packages, $3,402. Copenhagen, bicycles, eighty-three packages, $2,661. Christiania, bicycles, two packages, $75. Cuba, bicycles, three packages, $61; sporting goods, one package, $20. Dublin, bicycles, six packages, $60. Genoa, bicycles, forty-six packages, $2,870. Helsingfors, bicycles, two crates, $19. Havre, bicycles, 149 crates, $2,225; bicycle machinery, six packages, $576. Hamburg, bicycles, 140 packages, $5,000; bicycle material, twenty-two packages, $1,120. Leghorn, bicycles, one case, $25. Lisbon, bicycle parts, one package, $25. London, bicycles, sixty-three packages, $3,512; bicycles, nine packages, $452; sporting goods, fifty packages, $3,877. Lausanne, bicycles, five packages, $250. Malta, bicycles, three packages, $50. Peru, bicycle material, one package, $40. Rotterdam, bicycle material, thirty-eight packages, $933. Stockholm, bicycle material, ten packages, $250; bicycle material, eleven packages, $485. U. S. Colombia, velocipedes, four packages, $61. Varna, bicycles, four packages, $93.

The Six-Day Race

New York, Dec. 16.—One hundred thousand people at a conservative estimate attended the six-day bicycle race, which closed at Madison Square Garden on Saturday night. The order of finish, distance traveled and prizes won were: McEachern and Walthour, 2,555 miles 4 laps, $1,500; Maya and Wilson, 2,555 miles 4 laps, $1,000; Newkirk and Munro, 2,555 miles 4 laps, $750; Babcock and Turville, 2,555 miles 4 laps, $500; Butler and McLean, 2,555 miles 4 laps, $350; King and Samuelson, 2,555 miles 1 lap, $250; Hall and McLaren, 2,552 miles 9 laps, $150.

All the foreigners but Gougoltz, Chevalier, Fisher, Hall and McLaren and possibly Simar, will sail for home on Friday on the St. Louis. The rest will remain and probably compete in the coming 6-day races at Boston and Philadelphia. The former will be run at the Park Square Depot, be-

ginning Dec. 30, and the latter at the Exposition Building on Twenty-sixth street, beginning Jan. 14. Howe and McLean will run the Boston 10-hour a day race and Jack Prince and Charles Klosterman the Philadelphia 8-hour a day grind.

Garfield Park Track Doomed

The finest cycle track in America and probably in the world is to be destroyed. It stands at Garfield Park, Chicago, where it was built in 1896, by the park commissioners, at a cost of $25,000. It must go, they say, to make room for the people who want to play golf. Its demolition was decided upon at a meeting last week.

When the commissioners built the track they did it regardless of expense, for cycling was then so far ahead of all other forms of sport in the minds of dwellers on the west side that no comparison was possible.

Naturally this fact attracted the attention of the record breakers and many's the mark that was shattered on the old track. The Morgan & Wright club held the inaugural meet on October 3, 1896, and offered a star card. Michael rode there, this being his second appearance in this country. The little Welshman smashed a couple of records that day and set Chicago wild over the ease with which he followed the terrific pace set by the big machines. Johnson, then in the heydey of his fame, was a brother star and the pair got all kinds of records. The club held a meet the following year and these were the only open meets run on the old track.

Being in a public park, no admission fee could be charged, and consequently the track was of little use outside of affording training facilities for the small army of west siders who had racing aspirations. However, the record breakers made good use of it and for years they came every fall to pick a fight with Father Time. They were generally successful and the names of Johnson, Michael, Taylor, Miller and McDuffee, coupled with Garfield park, figured many times on the record slate.

Here it was that Chicagoans had their first opportunity to see the motor tandem in use. Taylor brought one with him and McDuffee trailed after him. It was a battle royal between the two for the mile record, the blue-ribbon mark of the cycling world. Taylor got it first with 1:22 2-5 on Aug. 3, 1899. Then McDuffee came on in November and tacked on a wind shield and made a better mark. The colored boy was modern and he, too, got behind a shield, riding a third in :27 1-5, a half in 40 1-5s and the full mile in 1:19, a mark that has never been beaten. Without a wind shield he rode a quarter in 20s flat. McDuffee, however, made 18 2-5s with his wind shield.

Although the public has always had free access to the track there has been only one fatality. In September, 1898, Harry Cline was killed while following a triplet, which was run into by a man on a single wheel swinging down from the bank.

The Cycle Business for 1902

Traveling men report no reason to suppose that the cycle trade will fall below its present level. They believe, on the contrary, that business will be satisfactory in 1902. A dealer at Springfield, Ill., makes this report: "We have ordered a number of wheels from the traveling men, to be shipped as soon as spring opens up, and I expect that the trade for the season of 1902 will be as good, if not better, than last season, and we had nothing to complain of. A great many people have supposed for the past two or three years that the bicycle business has run its course, but such is not the case. We sold a large number of wheels last season and the prospects are good for a successful season this year. The word 'season' is getting to mean the whole 12 months, as those who now ride wheels do so for the whole year, or a greater part of it. The bicycle is a thing that has come to stay on account of its many good qualities, and there will be a steady sale for years to come.

"There are practically no changes in the 1902 wheels, and the chain wheels still hold their own against the chainless wheels."

INTERESTING PAPER BY HART O. BERG

The author of the following paper is one of the veterans of the automobile world and enjoys the advantage of experience on both sides of the Atlantic. Hart O. Berg was formerly a resident of Hartford and connected with one of its foremost industries. There he enjoyed association with men like Col. A. A. Pope and George H. Day and became a believer in things with which they were connected. Although he was primarily a maker of guns—for he was associated with the Colts concern—he became interested in cycles as well and when, later on, he went to Europe to establish the Fabrique Nationalle du Guerre, at Liege, that concern devoted its attention to the manufacture of fire arms, bicycles, and, later, automobiles, following closely the patterns, of the Columbia machines and even using the name. Mr. Berg has been a European manufacturer for about seven years, but has spent a portion of his time on this side. These facts placed him in a position to deliver, before the Automobile Club of America, one of the most interesting lectures of its experience. With slight condensation the paper was as follows:

Among the world's best examples of evolution that of the automobile has been more exaggeratedly rapid, more pronouncedly energetic than any other recent mechanical development. This terrific advance has not been without costly trials and experiments and a concentration of thought which, first finding its encouragement in France, still continues to hold the lead in that country. This is but natural. The topographical conditions of France lend themselves so well to the development, not only of speeds and flying runs, but to long and continued excursions, which, added to the exhilaration of moderate speed, make touring both possible and enjoyable.

Less than 10 years ago, the late Mr. Levassor, whom I had the pleasure of knowing very well and whom I believe to be the father of practical automobiling, using the hydro-carbon motor of Herr Daimler, tried again and again to construct a mechanically propelled vehicle that would carry him but once around the fortifications encircling Paris without necessitating his stopping for repairs, or without his having some exasperating accident. It took him almost 2 years to fully accomplish this now almost ridiculously insignificant run. It was Mr. Levassor who first conceived the idea, as far as I know, of putting the motor in front of the dash, and it was due, I believe, to this disposition of the motor and the distribution of the mechanical parts of the carriage which necessarily follows when the motor is placed in front of the dash, that encouraged to ultimate success the various refinements which Mr. Levassor afterward worked out.

I may say a word here about the peculiarities of the French, with whom I have been living for many years and whose minds I greatly admire. The French are most prolific in ideas and have a power of concentration almost unlimited. No sooner is one machine built by a Frenchman than another is immediately planned by him to contain corrections and more recently developed practices, each individual inventor working well within the lines undertaken by him, and each one seemingly quite content to bring to perfection a specific organ or unit of the machine, disregarding in a measure the vehicle as an entity, led on, as it were, by the gratification experienced by him in realizing the perfect working of one particular element or unit of the vehicle. In other words, the French type of automobile of 1901 is not the result of work of any one man or firm of builders, but the type has been practically worked out unit by unit by specialists who have made each particular organ a study of their own.

For instance Mr. Lemoine, the head of the firm of the largest French axle builders, has made a specific type of axle and hub which seems to meet the exigencies of road runs. Michelin has developed a tire, as you all know, to meet the conditions of the weights of French carriages and the peculiar roads which run through France. Longuemarre has developed a carbureter of the float type which has long ago been recognized as standard.

Then comes the long list of motor manufacturers. Bouton of the De Dion company, a man who even today can be seen from 7 in the morning to 7 at night in his blue blouse, superintending the manufacture of thousands of motors. Buchet, who has made a special effort to reduce the weight of high speed motors, and the little 20-horsepower 4-cylinder motor which he manufactured for Santos Dumont and which was used so successfully in all of Santos Dumont's experiments, weighed, I believe, but 82 kilos, and I am told that he actually got 24 brake-horsepower out of this motor.

I might go on and enumerate to you the names of men in France who have in this way specialized and developed each particular organ of the now recognized types, and it is largely on this account that the French are today building carriages in which the element of experiment has been eliminated.

I think I now dare go on, even under the impression that perhaps you have received from me that I am convinced that the automobile must come from France. I shall before I finish convince you that the real home of the manufacture of automobiles will be in this country, and I think that perhaps I may be able to show you my reasons for believing that America will come forward with bounds and leaps as she always does, and will ultimately control the automobile purchasing markets of the world. I shall start by recalling to you that there are three distinct types of automobiles manufactured in France today: the steam, the electric and the gasoline-propelled.

In 1889 I spent most of the summer in Paris at the Universal Exposition and I was much impressed, as was everybody, with the boilerless steam engine of Serpollet. In a small pavilion on the banks of the Seine, Serpollet showed his little engine running, pounding, generating power, and using, as you all know, his capillary tube system. Serpollet was not long in building a motor carriage in which he incorporated his little piece of copper tube, through which was pierced the smallest kind of a hole. Water was pumped through this and by the application of heat, immediately produced steam, as it was needed, for his small single-action engines. Unfortunately, this hole soon became clogged; it was enlarged, and afterward a series of tubes was used. Then Serpollet made a carriage with a device ingenious enough, regulating the supply of fuel and the supply of water, the relation of the proportions of these supplies being controlled by one lever. Years afterward I bought a Serpollet carriage. I have never had so much fun with anything in my life. Sometimes it ran up hill in a beautiful way; sometimes I had hard work to run it downhill. The tubes kept flooding. I developed muscle in my right arm, with which I was forced to do a little additional pumping now and then, but I found a good opportunity of selling this carriage to the Shah of Persia, and I have no doubt that some of his numerous wives are now having lots of fun with it in Teheran.

This is about the only steam carriage, other than those for heavy traction (to which I shall refer later), which has appeared in France. It runs through the streets noiselessly and is easily controlled, but I found that one had to have not only a knowledge of mechanics to run this carriage, but one also had to be on the constant alert at every change of grade, when more or less water or more fuel had to be sent to the flash tubes, and instead of looking at the scenery and enjoying the fresh breeze, the air often became blue about me, and I became very tired of focusing my eyes on the jumping steam gauge. I have seen very few other steam carriages of the light type running through the streets of Paris.

I now come to electric carriages. During the 5 years that I have run an electric carriage through Paris (and I was one of the first to have an electric carriage there, and that an American one), I have had but once what the French call a "panne." It was just back of the Madeleine when I suddenly came to a standstill. At that time there were not many electric carriages in Paris, and I was immediately surrounded by a gaping crowd. I sent a mechanic for the vehicle and he found that a bolt had fallen into the motor and had broken a connection. I believe he fixed this in about 5 minutes and brought the carriage back to the charging station.

I may tell you here of rather an amusing incident which helped to enliven a fete given some years ago at the Automobile Club pavilion in the Bois de Boulogne. I had the pleasure of taking out Baron von Zuylen in my Columbia carriage to this fete. There

were a number of electric carriages drawn up in the garden of the automobile pavilion, and while we were at dinner we were startled by a sudden cry of fire. I must tell you that it had come on to rain very heavily and the downpour getting into one of Krieger's batteries, made a short circuit, causing his carriage to immediately burst into flames. I believe this is about the only instance I have ever known where rather a serious conflagration was brought about by too much water.

But these are all reminiscences and Krieger soon found a way to protect his battery. Today the Krieger type of electric carriage for coupes, victorias, landaulets, etc., is well established in Paris, and they have, I should say, perhaps 150 of them running about the streets. You will remember perhaps that this type of carriage has the steering and driving wheels in front; there are two motors, compound wound; the batteries are divided, part of same being in front and part in rear. The controller is vertical, having I believe at present 7 positions, 4 ahead, one braking position, and two backward. The controller is of the recuperative type, and I believe works very satisfactorily. The control is hand operated and the lever is immediately beneath the steering wheel. This makes it very handy and quick in action. The front steering wheels with their attached motors, which now, by the way, are being hung on springs, are necessarily very heavy, and a big reduction in the steering gear is required. Penumatic tires are used entirely on the front or motor wheels, while solid tires are being used on the rear wheels.

The Jenatzy type of vehicle is chain-driven, although this company has manufactured some carriages with two motors driven from the rear, as we are accustomed to see here. Their distinctive feature, however, is a foot control in addition to the hand control; that is, a lever worked by the foot throws in more or less resistance and consequently regulates the speed of the carriage. We all remember also the Sans-Souci or Torpedo carriage constructed by Jenatzy in which the motors turned the wheels directly without any gearing. I saw this carriage at one of its trial-speed runs (it was only constructed to go 1 or 2 kilometers) and it seemed to jump over the ground very much like a kangaroo; I should say that it was in the air at least one-quarter of the time.

The firm of Jeanteaud & Co. has also constructed a number of electric vehicles, but rarely more than one or two of the same type, all of which, however, have features about them of the more or less automatic interlocking can't-make-any-mistake variety. Jeanteaud's motor has usually been hung on a frame, and the carriages have been chain-driven.

There have been several other electric carriages built in Paris. Perhaps Mr. Milde has made more practical types than any other French manufacturer. These are more or less taken and modified from the lines laid down by the Columbia, of which I modestly beg to inform you there are a great many now running in France.

If you will let me here say a word about batteries which are so intimately connected with, and render operative, the electric carriage, I simply wish to recall to you the much talked of Fulman type, which has very large capacity and more or less limited life. The Plante system has been almost entirely abandoned, as this type is too heavy for electric road traction. The Heinz and the Aigle battery, both being of the pasted plate type, are perhaps now used more than any others.

The common pasted plate battery, such as is now produced by Heinz, one of the largest manufacturers, seems to work very well, is very cheap and the positive plates can be changed at a small cost. Batteries of this type weighing under 500 kilos at a discharge of 20 amperes, have a capacity of about 140 ampere hours.

A good feature of most of the French batteries, and one which has always recommended itself to me, is that each element of the battery is attached to its neighboring elements by nuts and bolts. This practice I believe was given up in this country, but they have carried it to perfection in France, and when an element for some cause or another goes down in capacity, it can easily be removed and replaced by a new one, not necessitating any burning together, as was the practice at one time.

I have not forgotten that my talk this evening was supposed to refer more especially to gasoline carriages. This is the burning question and perhaps interests us more than all the others combined.

CONCLUDED NEXT WEEK.

MISCELLANEOUS

Advertisements under this head 5 cents per word first insertion; 3 cents per word each insertion thereafter. Cash with order. Express orders, postoffice orders or stamps received.

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A List of Headings to be Used in the Motor Age

Automobile Directory

Makers Who Have Not Sent Details are Requested to Mark the Items They Manufacture and Send at Once to Motor Age, Monon Building, Chicago.

Automobiles, freight :
Automobiles, light delivery :
Automobiles, electric :
Automobiles, steam :
Automobiles, gasoline :
Ammeters and voltmeters :
Alarms, low water :
Asbestos cement :
Accumulators :
Axles :
Burners, kerosene :
Burners, gasoline :
Brakes :
Bodies :
Boilers :
Batteries, storage :
Batteries, dry :
Bearings, ball :
Bearings, plain :
Bearings, roller :
Bearings, ball thrust :
Balls, steel :
Bicycles, motor :
Bells :
Backs :
Binding posts :
Brazing compound :
Bolts and screws :
Coils, spark :
Cement :
Carbureters, other than surface :
Carbureters, surface :
Crank cases :
Cranks :
Charging outfits.
Controllers, electric :
Condensers :
Converters :
Chemical heaters :
Castings, aluminum :
Castings, bronze :
Castings, iron :
Castings, brass :
Castings, steel :
Clothing :
Cushions :
Cylinder oilers :
Color and enamel :
Coaster brakes :
Charging outfits, electric :
Case hardening material :
Chains :
Dashes :
Drive gates, automatic :
Engines, gasoline :
Engines, steam :
Engines, kerosene :
Frames :
Fenders :
Forgings, drop :
Forgings, rolled :
Frames, motor bicycle :
Fringes :
Glasses, water :
Glasses, gauge :
Gears, steering :
Gears, differential :
Gears, transmission :
Gears, running :
Gears, bevel :
Gear wheels :
Grease :
Grips, for steering bars :
Goggles :
Gauntlets :
Generators, gasoline :
Grease cups :
Gradometers :
Gearing, spiral :
Gauge cocks :
Gauges, gasoline :
Gauges, steam :
Graphite :
Heaters, feed water :
Horns :
Hydrometers :
Hubs :
Handles, steering :
Igniters, dynamo :
Injectors :
Indicators, for gasoline tanks :
Jacks, lifting :
Joints, flexible :
Lamps, oil :
Lamps, acetylene :
Lamps, gasoline :
Lamps, electric :
Lamps, water gauge :
Lubricants :
Lace, carriage :
Locks :
Leather substitutes :
Leather cloths :
Matting, rubber :
Mufflers :
Motors, cycle :
Motors, electric :
Mirrors, for steam carriages :
Machinery and tools :
Mud guards :
Nipples :
Name plates :
Odometers :
Oil, cylinder :
Oil cans :
Oil, lubricating :
Oilers :
Oil cups :
Oil hole covers :
Plug switches :
Plugs, spark :
Pinions :
Pilot lights :
Pipe joint compound :
Panels :
Pet cocks :
Pumps, water feed, power
Pumps, water, auxiliary :
Pumps, air :
Pumps, air and water, power :
Pumps, water, hand :
Pumps, oil :
Packing, rubber :
Plugs, fusible :
Quadricycles, motor :
Radiators :
Rims, wood :
Rims, steel :
Rivets, tubular :
Robes :
Regulators, water level :
Regulators, gasoline :
Spring belt tighteners :
Sprockets :
Spokes, wood :
Spokes, steel :
Spokes, tubular :
Stampings, sheet metal :
Seats :
Speedometers :
Screws, nuts, etc. :
Springs :
Springs, for motors :
Seats, attachable :
Spark plug porcelains :
Steering knuckles :
Steps :
Tools :
Tool cases, leather :
Tandems, motor :
Trimmings :
Tires, pneumatic :
Tires, mechanical :
Tires, solid :
Tire covers :
Tanks, air :
Tanks, gasoline :
Tanks, water :
Tricycles, motor :
Tops :
Tank fillers :
Tire repair tools :
Try cocks :
Tubes and shells, seamless :
Tubing, steel :
Tubes, boiler :
Top levers and springs :
Torch heaters :
Threads, silk and trimmings :
Valves, miscellaneous :
Varnish :
Valve stem eyelets :
Valves, tire :
Valves, throttle :
Valves, safety :
Wrenches :
Whipcords, twine, etc. :
Washers and bushings, mica :
Wheels, motor :
Wheels, tubular :
Wheels, wood :
Wheels, wire :

Name _____

Address _____

Catalogue Department

THE MOTOR AGE has established a catalogue department and will forward the catalogues of any or all advertisers on request.

The objects of this department are as follows:

1. To save the reader the trouble and expense of writing to each individual concern whose catalogue he may need.
2. To place advertisers in direct communication with prospective purchasers.

Applicants for catalogues will please state specifically the names of the concerns whose catalogues they desire and enclose stamps to cover postage.

Applications should be addressed to the Catalogue Department, MOTOR AGE, Monon Building, Chicago.